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Lead-Deadwood Sanitary District Facilities Plan

Environmental Protection Agency, Denver, CO

Oct 76

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The Lead-Deadwood Sanitary District is proposing to construct an advanced waste treatment facility and interceptor collector system for the Lead and Deadwood areas in the Black Hills. The plant will consist of secondary treatment plus ammonia and chlorine removal. The towns at present have no sewage treatment facilities except for a portion of Lead containing Imhoff tanks. Sludge disposal will be by truck haul to a landfill area near the Black Hills. Environmental impacts associated with the Lead-Deadwood facilities are discussed. (Portions of this document are not fully legible.)

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Lead-Deadwood Sanitary District #1
Deadwood, South Dakota
EPA Project No. C460200 (Originally SD200)

(x) Supplement to Final EIS

1. Name of Action: (x) Administrative ( ) Legislative

2. Description of Action: The Lead-Deadwood Sanitary District is proposing to construct an advanced waste treatment facility and interceptor collector system for the Lead and Deadwood areas in the Black Hills. The plant will consist of secondary treatment plus ammonia and chlorine removal. The towns at present have no sewage treatment facilities except for a portion of Lead containing Imhoff tanks. Sludge disposal will be by truck haul to a landfill area near the Black Hills.

This project has been under review and study by EPA since its inception in 1970. The original proposal in the final EIS of 1972 called for a combined industrial/municipal lagoon to contain the municipal wastes as well as the tailings and industrial waste discharges from the Homestake Gold Mining Company at Lead. Later investigations identified serious problems with the original proposal. EPA reopened the NEPA investigation on November 14, 1973, by means of a Supplement to the final EIS. After numerous evaluations including a potential land treatment scheme, the District chose the present treatment site in lower Deadwood, South Dakota, using a mechanical-biological advanced waste treatment system.

The Homestake Mining Company was included under the Lead-Deadwood Municipal Grant under provisions of the older P.L. 84-600. In the final decision on a facilities plan, Homestake agreed to construct a separate facility for storage of tailings at a site called Grizzly Gulch. Homestake also decided to pursue its own treatment of its industrial wastewater discharges at the recommendations of the State. This EIS considers the impact of the Grizzly Gulch site, nevertheless, since Homestake was part of the original project to improve Whitewood Creek water quality.

3. Environmental Impacts:

A. Impacts Associated with the Lead-Deadwood Facilities are discussed.

(Portions of this document are not fully legible.)

(1) There will be a variety of construction impacts including movement of 18,000 cubic yards of borrow material, effects on steep areas, dust noise, and air pollution from construction, sediment damage in stream tributaries, some loss of vegetation along streambeds, a potential effect on the fishery near Pluma, and some congestion and site construction impacts. All are expected to be relatively minor and short in duration.

(2) With the operation of the plant, minor odor problems may occur at times. Disposal of sludge in a landfill could create leaching problems if correct precautions are not taken.

(3) The project will have a considerable benefit in cleaning up Whitewood Creek. Treatment will remove a public health hazard from raw sewage in the Creek. Wells downstream will be afforded protection. Positive effects should be seen with the development of in-stream aquatic life. The stream will be able to be used for recreation and perhaps irrigation downstream. Land values along the stream and perhaps in both communities may rise with the creation of a more aesthetically pleasing stream.

(4) Some areas in the Lead-Deadwood vicinity will still be unsewered, and may create some stream problems in upstream Whitewood Creek tributaries.

B. Impacts Associated with the Homestake Grizzly Gulch Facility

(1) The Grizzly Gulch upper stream reaches will be obliterated with the construction and operation of the Homestake tailings dam. The existing fishery will be seriously damaged and may be destroyed. Land and aquatic animals using the Grizzly Creek will be affected. Some damage to downstream Whitewood Creek near Pluma could occur due to sediment damage. The construction impacts although severe, are not expected to be long-lasting except in the Grizzly Creek vicinity itself.

(2) The tailings dam at Grizzly Gulch does pose a threat albeit small, to downstream residents because of potential flooding.

(3) The positive benefits of the Homestake facility are large. None of the positive impacts mentioned under the Lead-Deadwood facility would have much meaning without an associated cleanup by Homestake. Homestake's facilities will remove the 3000 or so tons per day of tailings solids, cyanide, heavy metals, a major public health hazard will be removed, and the potential uses of Whitewood Creek for aquatic life, recreation, irrigation, will become possible with the Homestake facility.

(4) Some reduction of creek flow through Deadwood will occur as a result of this facility.

(5) A fishery may be established in Whitewood Creek as a result of both facilities, but the situation will remain problematic for some time, until monitoring determines whether the tailings already in the streambed will have negative effects on fish life.

4. Alternatives: This EIS presents alternatives treatment schemes for both Lead-Deadwood and Homestake Mining Company combined and Separately. The EIS traces the development of alternatives in the original EIS, during the period of reopening of NEPA considerations, in late 1973, during the time of Bauer, Scheaffer & Lear land treatment proposals, and during the formal facilities plan. Alternatives included physical-chemical, biological systems, land treatment, treatment to meet standards as well as lesser treatment.

5. Distribution: The distribution list is presented in Appendix D.

6. Supplement Sent To The Council On Environmental Quality On:

7. Public Hearing: A public hearing for this supplement will be held. The accompanying cover letter will identify the time and place.

Whitewood Creek

Grizzly Gulch

"Solutions to century-old problems cannot be easily and quickly reached. We cannot afford, in this day of depleting natural resources, to create more serious and harder to rectify problems while trying to solve another problem..."

Gary Enright, Director of the South Dakota Farm Bureau, asking EPA at public hearing held on December 22, 1971, to temper its action with understanding in seeking a solution to problems of mine wastes and municipal sewage in the Lead-Deadwood area.

Centennial Prairie

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I. INTRODUCTION

The Reason for this Document

When Gary Enright made his statement quoted at the beginning of this EIS, he could not have known how prophetic his position would be. At the time of the public hearing in 1971, the proposal already had the weight of four years of engineering study behind it. Little did he or anyone else know that almost five years later the project would still be under study.

Mr. Enright's admonition is well taken; the action contemplated in the final environmental impact statement of March 1972 on the Lead-Deadwood project could have resulted in complicated environmental problems. At a minimum, the costs for this project might well have been a number of times more than what was originally contemplated in trying to remedy the undesirable environmental after effects that could have occurred if the original project had been built.

A great deal of money has been spent on studying the Homestake Mining Company and Lead-Deadwood wastewater problems, both before and since the EIS. All parties involved -- Homestake, EPA, the Sanitation District, the State of South Dakota, the engineering consultants, the people in Lead-Deadwood and Centennial Valley -- have become frustrated with the lack of progress in trying to solve the problem.

Mr. Enright's timely statement should be kept in mind in understanding the events surrounding the Lead-Deadwood/Homestake situation. It is to a great extent the complexity of a century old problem, plus changing legislative requirements and economic situations that have forced numerous reappraisals of this situation. EPA can only hope that the best judgment has prevailed in the balancing of environmental with engineering and economic factors required under the National Environmental Policy Act.

This supplementary EIS then is intended to do the following things:

(1) Present a concise history of the events surrounding the Lead-Deadwood/Homestake project, particularly since the release of the final EIS in March 1972.

(2) Identify and explain EPA actions involving environmental, engineering and economic decision-making on this project, about various alternative courses of action suggested.

(3) Summarize the important environmental impacts surrounding the present proposal, and

(4) Evaluate the long-term impacts and implications of the present proposal.

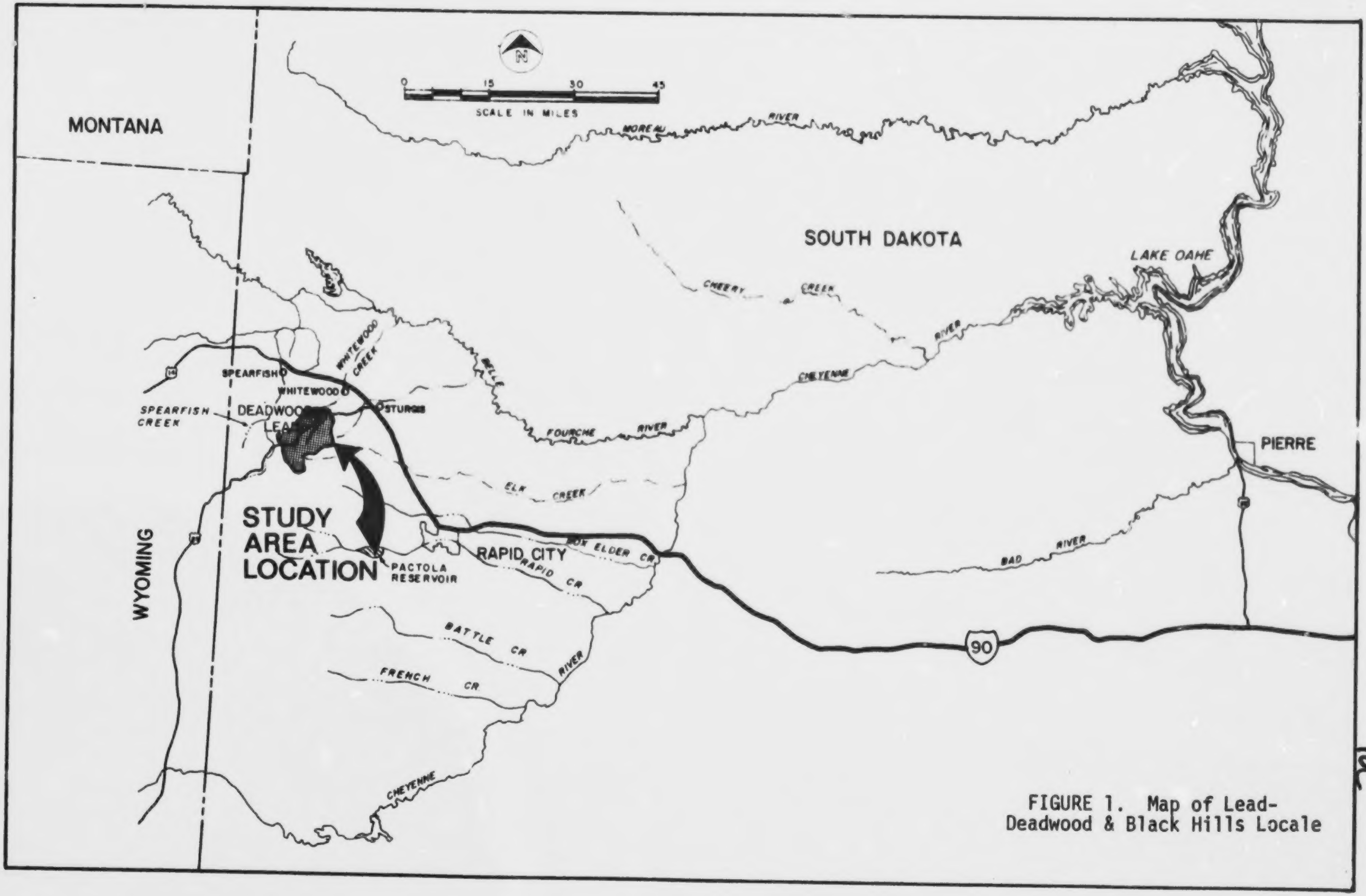

FIGURE 1. Map of Lead-Deadwood & Black Hills Locale

EPA has chosen to write a supplement to the original EIS because although a myriad of actions involving PL 92-500 legislation have occurred, and numerous alternatives have been evaluated, the scope of the project remains essentially the same as it was in 1972. Ironically, the alternative now proposed for the solution to both the Homestake and Lead-Deadwood Sanitary District is almost identical to one of the alternatives suggested in the 1972 EIS. EPA believes that the strong continuity in the actions plus its own continued involvement, argues strongly for such an addendum to the original EIS. Federal decision-making that integrates environmental factors as required under the National Environmental Policy Act should be a continuing, feed-back type process. The EIS will attempt to demonstrate EPA's environmental decision-making over the past five years. The only certainty there will be about such decisions is that no one will agree completely with the decisions EPA did make on this project.

The Present Proposal

The Lead-Deadwood Sanitary District #1 lies in the northern Black Hills of South Dakota at about 5,000' elevation. The towns are in the Whitewood Creek drainage which is tributary to the Belle Fourche and eventually the Cheyenne River, as shown in Figure 1.

The facilities plan developed for the District and submitted to EPA on May 9, 1976 calls for the construction of a secondary wastewater treatment plant to be located in lower Deadwood near the rodeo grounds. By the decision of the hearing officer of the South Dakota Department of Environmental Protection on March 5, 1976, the facilities must provide wastewater treatment for all domestic wastes within the District, and meet instream standards of ammonia no greater than 3 mg/l and a chlorine discharge of no more than .02 mg/l. The order specifies secondary treatment which by South Dakota water quality standards means an effluent BOD of 30 mg/l and suspended solids of 30 mg/l.

The facility would contain a raw sewage pump station, rotary screens, an activated biological filter system, two secondary clarifiers, chlorination and dechlorination systems, aerobic sludge digestor and sludge flotation thickening, and an administrative and laboratory area. Sludge disposal is expected to be by means of truck haul to a local sanitary landfill. The accompanying Administrative Report of the Facilities Plan presents the design criteria for this plant on pages 5 through 9.

This plant will service the towns of Lead and Deadwood and other areas such as Central City, Blacktail, and Glendale. Outlying areas including Deer Mountain, Terraville, Terry Peak, Bald Mountain and Nevada Gulch-Fantail were evaluated, but not included for service because of the high costs of servicing these small number of homes. Approximately 48,000 feet of new interceptor line will be built as shown in Figure 2 of the Administrative Report. Figure 2 of this EIS shows the outline of Lower Deadwood facilities recommended in the CH2M-Hill plan.

The plant will be designed to handle an average flow of 2.33 mgd. The total cost of the project is estimated at 5.4 million dollars. Total

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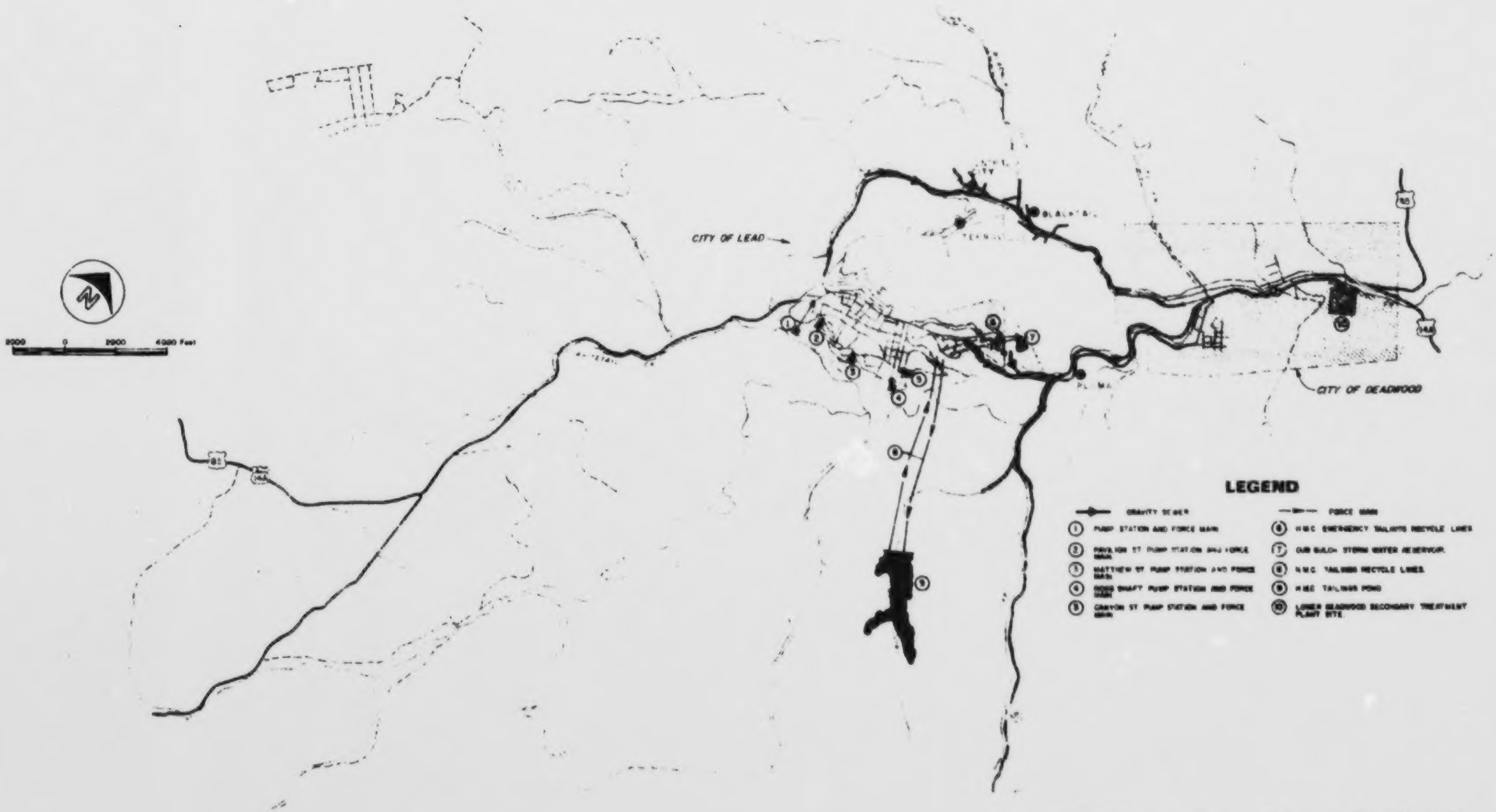
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⑥ HMC EMERGENCY TAILINGS RECYCLE LINES
⑦ [illegible] GULCH STORM WATER RESERVOIR
⑧ HMC TAILINGS RECYCLE LINES
⑨ HMC TAILINGS POND
⑩ LOWER DEADWOOD SECONDARY TREATMENT PLANT SITE

FIGURE 2. Map of Lead-Deadwood Facilities

The City of Lead, South Dakota With The Homestake Mine and Milling Facilities

annual cost of repayment and operation will be approximately $346,000 per year. Approximately 10,000 residents will be serviced.

Treatment for Homestake Mining Company's waste was originally to be accomplished through Lead-Deadwood Sanitary District facilities. The 1965 Water Pollution Control Act allowed industries to participate in municipal wastewater treatment grants as long as an equitable cost-sharing arrangement was made. At the urging of the South Dakota Department of Environmental Protection and EPA, Homestake decided to proceed with independent wastewater treatment facilities. Homestake is currently constructing a tailings storage dam on its own land in Grizzly Gulch to the southeast of Lead. Homestake is also initiating in-plant water conservation measures and is required to meet NPDES permit limitations by July 1, 1977 which will in effect eliminate the discharges of plant process water now containing toxic concentrations of cyanide, ammonia, and heavy metals. Only discharges of cooling and mine drainage waters will be allowed under the current permit.

Although recent cost data is not available from Homestake, earlier facility plan estimates of separate treatment for Homestake's operation were in the range of 7 to 10 million dollars capital cost, construction and perhaps $700,000 to 1 million dollars per year repayment and operating costs. Treatment levels were designed to meet the NPDES limitations shown on Page 23 of the Administrative Report. For analysis purposes, a treatment system for HMC was assumed using the Grizzly Gulch tailings dam, cyanide and cyanate oxidation, oxidation, flocculation and clarification, pH adjustment, and mixed media filtration. (115)

The History of the Project

The perspective developed in this section is basically an overview; many relevant details simply could not be included at this point. The purposes here are to acquaint readers not familiar with the problems, and to fix the various decision points in time on the project. In the section on alternatives, the EIS will describe the thinking of EPA in weighing various environmental and social factors regarding the selection of an alternative. A more complete listing of events surrounding this project can be found in Appendix A, references and a chronology of events.

The Homestake mine has been in operation since 1876. After some early process changes such as the development of the cyanidation process to replace the older smelting process, the mining operation has produced around 500,000 ounces of gold per year for about ninety years. During this time, the plant discharged much of its ground rock wastes into Whitewood Creek, on the order of 3,000 tons per day. Toxic pollutants have also been continuously discharged: waste cyanide, solid and dissolved heavy metals, ammonia, and arsenic that is found in quantity in the ore. Until 1971, process mercury was also discharged.

The cities of Lead and Deadwood grew up around the mining operation. The cities are rich in Western cowboy-miner lore, including the place where Wild Bill Hickock was shot to death in a local saloon. The cities are both still highly dependent on these two activities (gold mining and tourism) for economic survival.

Perhaps in part because of the odor-masking effect of cyanide in Homestake's Whitewood Creek discharge, both cities have remained without sanitary wastewater treatment up to this day. Aside from septic tanks and Imhoff tanks that service a small part of Lead, all other parts of this District simply discharge raw sewage through the cities' collection systems directly to Whitewood Creek and its tributaries in 39 separate points. (102)

Studies in 1960 (1) and 1965 (3) documented the massive pollution problem from these two sources. Whitewood Creek is essentially devoid of any aquatic life. From the confluence of Whitewood Creek with the Belle Fourche and the Cheyenne River, these rivers also show appreciable pollution problems due to Homestake-Lead-Deadwood discharges. High mercury concentrations were noted in the downstream waters and associated aquatic species. Governor Kneip specifically requested assistance from EPA to analyze the problem and to seek solutions. The Enforcement Conference Report on Pollution Affecting Water Quality of the Cheyenne River System of September 1, 1971, by EPA more clearly articulated these pollution problems and recommended rapid action in the form of a combined Homestake/Lead Deadwood treatment facility to solve this problem.

The Lead-Deadwood Sanitary District was formed by the South Dakota legislature in April of 1969, with a charge to solve the water pollution probmens of the area caused mainly by domestic and industrial wastes. Earlier engineering studies (2), (4) for the Homestake Mining Company had recommended the use of combined tailings storage-sewage lagoon to solve the problem. The Kirkham-Michael report specifically identified Centennial Prairie as the best location for such a lagoon.

The District hired Brady Engineering Company to develop its preliminary engineering plan for a wastewater facility. Brady essentially favored the same combined lagoon system at Centennial Prairie.

On April 12, 1971, the Lead-Deadwood Sanitary District made application to the Kansas City Regional Office of the Federal Water Quality Administration (FWQA) for Federal financial assistance in the construction of an interceptor sewer, tailing stabilization pond and outfall sewer all under the original project designation SD 200, now designated C460200. The estimated project cost at the time of application was $5,422,000. The FWQA, a predecessor agency of EPA, was empowered to fund up to 33% of the estimated total eligible project cost under Section 8 of the former Federal Water Pollution Control Act.

There was considerable impetus to commence construction as soon as possible on this project, because of the enforcement conference under Section 10(d) of the former FWPCA held in Rapid City, South Dakota in the fall of 1971. The conference effected the sense of urgency to solve the serious pollution problems.

The environmental impact statement (EIS) deemed necessary to comply with the National Environmental Policy Act of 1969 (NEPA) had been started by the Federal Water Quality Administration (FWQA) in Kansas City prior to the time the files were transferred to the newly established Region VIII office of the EPA. The process had to be completed by the newly assembled staff in the Denver office. On December 6, 1971, a draft EIS was issued by EPA following which hearings on that EIS were held in Deadwood, South Dakota, on December 21, 1971. The final EIS was issued in March, 1972. This EIS, in general, recommended going forward with the project as proposed, which called for the combined industrial/municipal waste stabilization pond to be placed at the head of Centennial Valley.

Testimony at the public hearing and in written comments reflected a serious concern about possible contamination of groundwater in Centennial Prairie, effectiveness of treatment in the lagoon, and even potential collapse of the dam because of the geological strata underneath the dam. Because there were unanswered questions regarding the geology of the project area, EPA insisted that necessary safeguards be taken to prevent groundwater pollution. These concerns were stated in a series of conditions of the grant offer shown in Appendix B of this EIS. As a result, further subsurface exploration studies were undertaken prior to any construction on the project.

The grant offer in the amount of $1,789,550 was awarded to the District on April 24, 1972, and was accepted by the District on May 2, 1972.

It should be noted that on October 18, 1972, with the enactment of the Federal Water Pollution Control Act Amendments of 1972, the Lead-Deadwood grant became eligible for an increase in the then existing grant from 33% to 75% under Section 202 of the new Act. On December 29, 1972, the grant was increased to $4,757,015 which was based on an increase in estimated eligible project costs to $6,342,690.

The subsurface explorations in late 1972 and 1973 revealed that major geologic difficulties would be encountered in both the construction of the tailings dam and in attempting to properly seal the basin to prevent seepage of the basin contents into the groundwater. These problems were principally due to the fact that the formations which make up the geology of the basin are both fractured and discontinuous. In addition, there are gypsum pockets scattered throughout the basin which make for solution cavities which would permit intrusion of the contents of the basin into the groundwater formations of the area. The test borings revealed the presence of rather large caverns in the area of the dam itself that would require expensive blasting and removal of part of the Spearfish formation in order to guarantee the safety of the dam. (42) (59)

One of the Original Sites Suggested for the Tailings Storage Area in the 1972 EIS was the Old "Open-Cut" Near Lead

The foregoing problems caused the costs of the proper sealing of the basin and constructing the dam to escalate dramatically. A late cost estimate on this originally conceived project was dated October 5, 1973, and it had risen at that time to $12,446,200. At this point, alternatives which had been dismissed because of cost once again appeared to be reasonable project alternatives.

In view of the possibility of groundwater contamination and other problems posed by the subsurface exploration and the consequent escalation in the cost of the project, EPA decided to reopen the EIS process in mid-1973, and in effect, compel another look at alternative solutions to the problem by EPA and the Sanitation District. EPA chose to do this by treating the former Final EIS conceptually as a Draft EIS upon which public comment at a hearing would be invited. A brief Supplement to that document was prepared outlining the various problems encountered since the filing of the former Final EIS in March, 1972. The Supplement plus certain of the construction grant files were also made available to the public prior to the second hearing. The Supplement was published in the Federal Register on November 14, 1973.

In November of 1973, the Save Centennial Valley Association, which was made up of farmers and ranchers of the Centennial Valley area filed a lawsuit against the EPA. The lawsuit alleged that EPA had not properly complied with the National Environmental Policy Act and had not applied the more stringent provisions of the 1972 Water Pollution Control Amendments and other Federal laws to this project.

The hearing to consider the reopening of the EIS process commenced on December 12, 1973; the hearing board was made up of representatives of the South Dakota Department of Environmental Protection and EPA personnel. These hearings ran for four days and were recessed due to the necessity of gathering additional and important evidence in the nature of recent studies developed by the District, which was presented by them for the first time at the hearing. The Sanitary District announced that it had dismissed its original lead consulting firm of engineers and had obtained the services of another firm, Bauer, Scheaffer and Lear. A new concept, the so-called Grizzly Gulch Plan developed by Bauer, Scheaffer and Lear was later submitted to EPA by the District in the nature of a request to modify the originally conceived project.

The 1972 version of the project envisioned taking all of the District's domestic wastes plus the tailings and other wastes of Homestake and depositing them in a holding basin in Centennial Valley. This method of disposal would have been used until this holding basin was filled. The Grizzly Gulch Plan was basically as follows: The domestic wastes of Lead would be added to the wastes from the Homestake Mine and conveyed to a basin formed by a 200+ ft high dam at Grizzly Gulch (most of which is owned by Homestake). The solids would be stored behind the dam. As part of the proposal, the liquid portion of the wastes stored behind the dam during warmer months, would be run over 400-500 acres of forested steep terrain through the use of spray irrigation. This form of land application treatment was contemplated to effectually yield a discharge that would meet 1985 Congressionally defined water quality goals. The remainder of the domestic wastes of the District (primarily from Deadwood) would be conveyed to property owned by the District in Centennial Valley and treated in a stabilization pond. Core drillings revealed no subsurface problems in this portion of the Valley for this low head type of storage. The domestic wastes would, through land application at Centennial Prairie, provide tertiary treatment thus also meeting water quality standards in Whitewood Creek.

EPA set up a task force consisting of Region VIII staff and two experts on land treatment, Richard Thomas from EPA's Kerr Environmental Research Laboratory and the other a nationally known academic figure, Dr. William Sopper, to review this plan in detail. On July 3, EPA wrote the District about concerns with the Bauer, Schaeffer/Lear plan, and offered some suggestions toward resolving the question of the best form of wastewater treatment for the Lead-Deadwood area. EPA was particularly concerned with the preliminary nature of the plan; further, the proposal would have had to be considered experimental in view of the novel application of the mine wastewater and sewage to fairly steep forested hillsides in a semi-arid climate. Concerns were also voiced about the proposed operation in Centennial Valley where local objection was involved. EPA further suggested a number of alternatives that needed to be considered, including the possibility of having Homestake pursue its own wastewater treatment.

On July 30, 1974, the EPA Regional Administrator chaired a meeting between representatives of the District, the Save Centennial Valley Association, the South Dakota Department of Environmental Protection, the public, and EPA staff to review the status of the project, to review what further alternative methods of treatment need to be explored and to arrive upon a mutually acceptable course of action toward expeditious resolution of this serious pollution problem. On August 14, 1974, EPA's Regional Counsel chaired a meeting in Lead, South Dakota, which was attended by the District's newly obtained lead consulting firm CH2M Hill, representatives of the District, Save Centennial Valley Association, the South Dakota Department of Environmental Protection, and EPA personnel. At that meeting a more detailed timetable was agreed upon and agreement was reached as to the scope of work to be performed, under a new step 1 grant to the District, for the purpose of reviewing further alternatives.

P.L. 92-500 specifies a three step planning-design-construction procedure that must be followed on wastewater treatment grants. Although the Lead-Deadwood grant of 1972 fell under the older legislation, the addition of PL 92-500 monies to increase the Federal share of the grant from 33 to 75% brought the grant into conflict with many of the requirements of the newer legislation. A serious problem of how this grant should be handled arose. EPA and the State did not want to lose the grant by return to the Treasury, since the grant represented over 65% of South Dakota's total allotment of construction grant funds.

It was agreed then to require planning on the Lead-Deadwood facility according to the full requirements of PL 92-500 and EPA regulations developed to administer this law. Thus a full 201 facilities plan was prepared by the consultant CH_2M-Hill, and accompanies this EIS supplement.

EPA simultaneously developed the Section 402 National Pollution Discharge Elimination System (NPDES) permit for Homestake and the District required by the Act. It was felt that with the complexity of the discharge involved, a detailed bioassay study should be performed to evaluate the proper effluent limits. This was done by the National Field Investigations Center Laboratory of EPA in late 1974. Because it was not clear whether Homestake and Lead-Deadwood would discharge jointly or separately, alternative permits were drawn up. EPA issued the permits in late 1974 after facing testimony in a public hearing on November 14. Both Homestake and Lead-Deadwood objected to the conditions of the permit and requested an adjudicatory hearing. Negotiations between EPA & Homestake on permit conditions may have resulted in a final agreement as of the time of writing this EIS.

Here at Whitewood, South Dakota, Salt Can be Seen Leaching from the Tailings Along Whitewood Creek

On November 15, 1974, EPA, the Sanitary District, Homestake and Save Centennial Valley Association agreed to settle the lawsuit against EPA out of court. The principal conditions of the settlement were that the Lead-Deadwood Sanitation District and Homestake would agree to forego the construction of any wastewater treatment facilities below Deadwood (including Centennial Valley), and that the Association would monitor the progress of decisions on the wastewater facilities plan.

EPA staff subsequently attended a number of review meetings held to develop the facilities plan. Design criteria were developed and alternatives defined to meet the water quality standards in effect for Whitewood Creek. At the time of the initial Centennial Valley project in 1972, minimal water quality standards were in effect for Whitewood Creek. With the passage of P.L. 92-500, however, the Congressional goal of "fishable, swimmable water wherever possible by 1983", dictated that Whitewood Creek be designated as a cold water fishery. Given the background natural conditions of flow temperature, and biota, a trout fishery could be eventually expected. State and Federal biologists agreed that within a relatively short time frame, scouring of in-stream tailings would allow the re-establishment of the historical fishery in Whitewood Creek. The State of South Dakota accordingly classified the stretch of Whitewood Creek and its tributaries above the I-90 bridge near Whitewood, S.D. to its headwaters as a cold-water permanent fishery.

This classification presented a severe task for the Lead-Deadwood facility plan consultant. Extremely stringent limitations on heavy metals, cyanide, ammonia, BOD, suspended solids and chlorine would be required. PL 92-500 requires a margin of protection for aquatic species by setting NPDES permit limits at low flow conditions. Although Whitewood Creek has not been regularly measured for flow, extrapolations of low-flow from a similar Black Hills stream indicated that effluent standards would almost be as rigorous as in-stream standards. Relatively little dilution could be expected.

The consultant's task in the analysis of facilities plan alternatives (at EPA and State request) was to evaluate treatment facilities to meet these standards, to meet minimal secondary treatment standards, and an intermediate level. Combined Homestake/Lead-Deadwood systems were evaluated along with separate systems. Land treatment was compared with other conventional systems.

It was discovered that the lawsuit settlement precluded treatment site locations virtually anywhere below Deadwood, where conventional sewage lagoons might be located. After examination of the data for treatment costs to meet the effective water quality standards, it became apparent that treatment costs to meet standards would create an extreme hardship on the Lead-Deadwood community. The State of South Dakota also did not have nearly enough PL 92-500 monies allocated to it to pay the costs of these alternatives designed to meet water quality standards.

After the initial investigation of alternatives had been completed, the State Department of Environmental Protection recommended to Homestake to proceed independently with wastewater treatment on August 19, 1975. Earlier in 1975, the Lead-Deadwood Sanitary District petitioned the State to modify the water quality standards on Whitewood Creek. With EPA approval, the State Department of Environmental Protection modified the classification of Whitewood Creek between lower Deadwood and the I-90 bridge near Whitewood to a cold-water marginal fishery.

On September 8, Homestake notified EPA and the State that it would proceed independently with the construction of the Grizzly Gulch tailings facility.

Because of the exhorbitant costs of treatment alternatives to meet standards, it became more apparent by late 1975 that some thought would have to be given to interim or phased treatment. Although the eventual rehabilitation of Whitewood Creek to some sort of fishery was agreed upon, the length of time it would take once all the immediate discharge of tailings, cyanide, sewage and other pollutants was eliminated, is still a matter open to question. Given the State's limited funds available for this project, treatment alternatives for domestic sewage for Lead and Deadwood now focused on meeting secondary standards with certain ammonia and chlorine limitations. The District advanced a number of possible lagoon-type alternatives at Slaughterhouse Gulch and lower Grizzly Gulch (separate from Homestake). EPA and State review of these alternatives pointed to the unreliability of treatment of these proposals.

The District also petitioned the State Department of Environmental Protection to waive compliance with the State water quality standards. On December 15, 1975, the Secretary of the Department of Environmental Protection (DEP) recommended a timetable for compliance with the water quality standards. A secondary treatment plant should be built to treat all of the District's domestic wastes. In addition, ammonia in-stream levels were to be kept below 3 mg/l and chlorine below .02 mg/l. A later decision on March 5, 1976 by the Department of Environmental Protection hearing officer confirmed these recommendations and set a mandatory date for plant operation by July 1, 1988. (July 1979 for the AWT portions) In-stream monitoring would have to be developed; by July 1, 1988, applicable water quality standards would have to be met unless the District could establish that rehabilitation of Whitewood Creek was not occurring because of events outside its control. Pages 18-20 of the attached Administrative Report contain the findings of the DEP hearing officer.

On November 6, 1975, EPA published national regulations on the "Best Practicable Treatment Technology" regulations for Ore Mining/Dressing water quality discharges, as required under P.L. 92-500. The regulations stipulated a "no-discharge" policy for this type of operation based on current technology. EPA Region VIII therefore re-wrote the NPDES Permit for Homestake to reflect this change of regulation. Under this permit only mine water drainage and cooling water would be discharged by the Homestake facility. Homestake has filed an appeal against the regulations and had requested an adjudicatory hearing. EPA has been negotiating with Homestake over permit conditions, and it is believed that final permit conditions may be established at present for the Homestake permit.

On May 5, 1976, the final facilities plan comprised of the three documents attached to this EIS were submitted to EPA. The selected plan calls for the construction of the secondary treatment wastewater facility in lower Deadwood to meet the criteria requirements called for in the findings of the DEP hearing officer of March 5, 1976.

As noted, Appendix A of this EIS contains a dated summary of the above-mentioned events and other relevant EPA activities.

II. ALTERNATIVES TO THE PROJECT

Alternatives evaluation is a critical portion of this environmental impact statement. It is not possible to compare all the alternatives simultaneously. Some depend on the experience of earlier alternatives; others were relevant only after P.L. 92-500 was passed. The bulk of this analysis will be to simultaneously analyze alternatives that were relevant at various points in time. The four relevant time periods of EPA decision-making would be as follows:

A. At the time of the original EIS (Dec. 1971 to March 1972)
B. At the time of the reopening of the NEPA process (Oct.-Dec. 1973)
C. During the period of the Bauer, Scheaffer, Lear Plan review (Jan. to Aug., 1974)
D. During the period of the facilities plan review (Jan. 1975 to present)

The evaluation will attempt to focus on the relevant issues, environmental and otherwise, that played a role in eventual decisions or actions taken by EPA.

A. Alternatives in the Original EIS (Dec. 1971-March 1972)

Alternatives information from the final EIS on the Lead-Deadwood project is shown below as Table 1.) The first five alternatives listed involve a combined Homestake/Lead-Deadwood pond facility at different sites. The last five alternatives show separate industrial-domestic treatment. Those alternatives labelled (cyclone) show an industrial process of separating tailings at the Homestake and hauling elsewhere to disposal. The major objections to each alternative are listed in the far right-hand column.

1. Relevant Factors:

a. The Financial Situation of Lead & Deadwood

Lead & Deadwood were considered relatively poor towns, containing a high proportion of older residents on fixed incomes. The bonding indebtedness limit of both towns was statutorily fixed at $2.0 million dollars in 1972. Therefore, all of the last five separate treatment alternatives could not be afforded by the District.

b. The Financial Situation of Homestake Mining Company

Gold prices had been mainained at an artificially low price by national legislation. The Homestake Mining Company showed only a minimal profit from its Lead-Deadwood operation during 1971-1972. Miners working for Homestake were required to absorb a pay cut in order to keep the mine in operation.

TABLE 1. ALTERNATIVE SOLUTION COST SUMMARY FROM FINAL EIS

	ALTERNATIVE	DESIGN PERIOD (YRS.)	-------(COST IN MILLIONS)------- TOTAL COST OVER DESIGN PERIOD	CONSTRUCTION COST	ANNUAL OPERATION COST	FUTURE EXPANSION	MAJOR OBJECTION TO PROJECT
1.	Centennial Prairie - tailings pond. (Applicant's proposal)	20	7.04	5.60	.072	Yes	Possible ground-water contamination
2.	Mountain Meadow - tailings pond	20	10.24	6.10	.207	Yes	High pumping costs
3.	Downstream Whitewood - tailings pond	15	6.88	5.80	.072	No	Public health hazard
4.	Whitewood Creek - tailings pond	20	16.85	15.85	.050	No	Public health hazard
5.	Open cut - tailings pond	12	7.05	5.75	.108	No	Safety hazard to miners
6.	One domestic pond*	20	6.3	5.4	.045	Yes	Cost too high for community without cost sharing from industry
	Separate industrial (cyclone)	20	48 **	--	2.4**	Yes U	
7.	One domestic pond-Mountain Meadow	20	5.94	4.9	.052	Yes	Same as No. 6
	Separate industrial (cyclone)	20	48 **	--	2.4**	Yes U	
8.	One domestic plant	20	5.64	4.2	.072	Yes	Same as No. 6
	Separate industrial (pond)*	20	5.96	5.0	.048	Yes	
9.	Two domestic plants	20	5.9	4.1	.090	Yes	Same as No. 6
	Separate industrial (pond)*	20	5.9	5.0	.045	Yes	
10.	One domestic plant	20	5.64	4.2	.072	Yes	Same as No. 6.
	Separate industrial (cyclone)	20	48 **	--	2.4**	Yes U	
11.	Two domestic plants	20	5.9	4.1	.090	Yes	Same as No. 6
	Separate industrial (cyclone)	20	48 **	--	2.4**	Yes U	

Note - Costs do not include interest.

**Transportation costs only.

*Site at Centennial Prairie

U - Tailings disposal site unknown, construction costs not calculated.

c. The Environmental Factors at Centennial Prairie

Geological evaluations available at the time indicated the existence of gypsum solution cavities and the outcrop of Minnekahta limestone under the proposed water surface level for the lagoon. Testimony from residents in the area indicated unpredictable losses of water through such cavities. Other impoundments in the area demonstrated problems in holding water, even with sealing measures. (21) Expert geologic testimony (13), (20) at the time did indicate that such problems could be overcome. Groundwater was a critical issue because a number of these geologic formations served as regional aquifers for drinking water supply.

Construction of the pond would have created a generally unpleasant aesthetic situation. 320 acres of productive farmland would be lost.

d. Efficiency of Pond Treatment

Considerable differences of opinion inside and outside of EPA existed as to treatment efficiency. Cyanide might be converted to a number of different chemical forms within the pond - (thiocynates, ferri-ferrocyanide, ammonia and carbon dioxide (20), (22), (24), (27). The rate of cyanide removal was thus open to question. A difference of opinion also existed as to whether toxic metals leaking through tailings would or would not be removed. Well data along Whitewood Creek indicated the absence of mercury and arsenic found in tailings (20). Other test data indicated some potential movement. Collapse of part of the pond with gross movement of liquid through solution cavities would not result in metals or other toxic pollutant removals. The presence or absence of an anaerobic condition at the base of the pond was debated. Aeration was favored in some cases (24), (19), opposed by others because of potential oxidation and re-solution of precipitated metals.

2. Decision and Resolution by EPA

EPA eventually decided to approve the project because of the lack of feasible alternatives. At this point only a "no-action" alternative appeared a reasonable alternative. The Enforcement Conference of October, 1971, of course, strongly urged treatmement facilities to eliminate the public health problem associated with Homestake/Lead-Deadwood discharges into the Cheyenne River and Oahe Reservoir system.

EPA subsequently added amendments to the construction grant shown in Appendix B to require minimization of seepage to groundwater and a monitoring program for the District to adopt ordinances that would require pre-treatment of industrial wastes in the event pollutants were discovered in the groundwater. Unfortunately, action would not have been taken until the groundwater problem already existed. A grant for construction was offered by EPA on April 24, 1972, to the Lead-Deadwood Sanitary District. Pre-construction core drilling would also have to be done to better evaluate geologic conditions.

B. Alternatives to Project During Period of EPA Reopening of NEPA Process (Oct.-Dec., 1973)

Following the acceptance of the grant by Lead-Deadwood Sanitary District, Brady Engineering Company began work on design of the project. The District obtained part of the land needed for the project by sale and part by a condemnation suit. The District hired the firm of Hoskins, Western & Sondregger to obtain detailed geologic and hydrologic data at the Centennial Prairie site. After the passage of PL-92500 on October 18, 1972, the District became eligible for a grant increase of up to 75% of project costs with new monies. The District applied for and received a grant that now totalled approximately 4.78 million dollars of Federal monies.

During 1973, new cost estimates for the project were sent to EPA based on new geologic information at the Centennial Prairie site. As of August 16, 1973, the total estimated project cost had risen from $5.6 million to approximately $12.7 million dollars and rising. EPA became concerned with the costs and the environmental problems that had surfaced regarding the protection of the groundwater in Centennial Prairie. EPA retained the U.S. Bureau of Reclamation to review the findings of the geological consultant for EPA. Save Centennial Valley Association continued to object to proceeding with the proposed project because of the uncertanties involved with the Centennial Prairie site.

EPA decided later in the same year to reopen the National Environmental Policy Act process on this project. EPA officially notified all interested parties of its intention formally by publication of a supplement to the final EIS on November 14, 1973. This document reopened the process of reinvestigating alternatives to the project. A public hearing was scheduled for December 11, 1973, in Deadwood to take testimony in regard to project alternatives. On the 14th of November, Save Centennial Valley Association filed suit against EPA and the District.

The District submitted to EPA a revised cost estimate for all of the alternatives that is shown in Table 2. At the time of the hearing, the question of which of the alternatives suggested in the final EIS might be the most cost-effective and environmentally compatible was EPA's primary concern.

1. Relevant Factors:

a. The Situation at Centennial Prairie

The Hoskins-Western-Sondregger report (42) noted the presence of gypsum deposits at considerable depths in the Spearfish formation. Not only sinkholes, but cavernous areas were present both in the vicinity of the proposed dam foundation and in the area underlying the proposed ponding area. The consultant proposed two methods to remedy these problems -- excavate below the dam to remove the cavernous areas, and deposit a nine-foot compacted soil or bentonite layer over the entire pond area. The revised cost estimates for this solution were 7.9 million

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TABLE 2. ALTERNATIVES COST SUMMARY OF OCTOBER 5, 1973

----- (COST IN MILLIONS) -----

ALTERNATIVE	DESIGN PERIOD (YRS.)	TOTAL COST OVER DESIGN PERIOD	CONSTRUCTION COST	ANNUAL OPERATION COST	FUTURE EXPANSION	MAJOR OBJECTION TO PROJECT
1. Centennial Prairie-Tailings (ALTERNATE A)	20	14.0	12.7	.065	Yes	Possible grour water contamination
2. Mountain Meadow Tailings Pond	20	22.05	17.85	.210	Yes	High pumping costs
3. Downstream Whitewood Tailings Pond	15	14.83	13.23	.080	No	Public Health Hazard
4. Whitewood Creek Tailings Pond	20	18.95	17.75	.060	No	Public Health Hazard
5. Open Cut-Tailings Pond	12	8.68	6.44	.112	No	Safety hazard to Miners-pumping cost
6. One domestic pond* (ALTERNATE B)	20	6.4	5.4	.052	Yes	Possible groun water contamination
Separate industrial (Cyclone)	20	52**	--	2.6**	Yes U	
7. One domestic Pond (Mountain Meadow)	20	9.3	7.5	.090	Yes	Costs too high for community without cost sharing from industry
Separate Industrial (Cyclone)	20	52**	--	2.6**	Yes U	
8. One Domestic Plant	20	8.60	7.1	.075	Yes	Costs too high for community without cost sharing from industry
Separate Industrial (Pond)*	20	8.80	7.5	.065	Yes	
9. Two Domestic Plants	20	9.4	7.5	.095	Yes	Costs too high for community without cost sharing from industry
Separate Indust (Pond)*	20	8.80	7.5	.065	Yes	
10. One Domestic Plant	20	8.6	7.1	.075	Yes	Costs too high for community without cost sharing from industry
Separate Indust (Cyclone)	20	52**	--	2.6**	Yes U	
11. Two Domestic Plants	20	9.4	7.5	.095	Yes	Costs too high for community without cost sharing from industry
Separate Indust (Cyclone)	20	52**	--	2.6**	Yes U	

Note - Costs do not include interest.

* Site at Centennial Prairie

U-Tailings Disposal Site Unknown - Construction Costs Not Calculated

** Transportation Costs Only

) Update of Table 2, Page 12, Environmental Impact Statement dollars for the dam and perhaps 1.5 million dollars for the 9-foot bentonite layer. These would have to be added to collection and transportation costs called for in the original grant. Seepage would still be on the order of 50,000 gpd, with no guarantee of quality.

b. Studies by the Colorado School of Mines Research Institute (CSMRI) on Effluent Quality of Pondwater

The CSMRI was hired to define the effluent quality of seepage water likely to enter the Centennial Prairie formation. Studies were to be made of the likely alterations in water quality as a result of transport as seepage through tailings and compacted Spearfish shale. Specific parameters studied were Cu, Zn, As and cyanide. The studies showed that the concentrations of Zn and Cu were lowered in contact with slimes and Spearfish shale, while arsenic was not. Cyanide concentrations dropped to less than 0.1 mg/l with long residence times. Lower pH's significantly raised the solubility of the pollutants. Thus while some of the concentrations would drop, some concentration of metals could still be high and could pose a potential problem to local water supplies.

Biological mortality studies were also performed. The consultants recommended minimizing seepage that could enter local groundwaters. Post-treatment was recommended for any effluent discharge from the pond. Acidification of sulfide in tailings was to be minimized to prevent resolubilization of tailings.

c. Decision by Homestake to Abandon Deadwood Slime Plant

Homestake added a new gold recovery process using "carbon" at the Lead plant and eliminated the Deadwood slime plant shortly after completion of the Lead-Deadwood final EIS. This meant that all of the HMC industrial discharge would now occur at Lead, which made collection and transport simpler and easier.

d. The Passage of the 1972 Water Pollution Control Act Amendments (PL 92-500)

This comprehensive water pollution law passed on October 18, 1972, allowed the District to receive up to 75% of eligible costs of the grant. A provision in the law set monies aside to bring older Title 8 Grants from the 33% Federal-reimbursible share to 75%. The District was awarded 4.8 million dollars based on the original grant.

The law set up a complex planning, standards setting, implementation and enforcement process for water quality improvement that EPA was just beginning to integrate into its program activities. The law,

Centennial Prairie Where the Sanitary District Aquired 200 Acres

of course, specified as its goals the "attainment of water quality which provides for the protection and propagation of fish, shellfish and wildlife, and provides for recreation in and on the water by 1983" and that the discharge of pollutants into the navigible waters be eliminated by 1985. EPA was required to develop criteria and standards with the States to insure that these goals be met on each State's streams wherever possible. EPA was also required to develop a permit system (termed the National Pollutant Discharge Elimination System - NPDES) to set limits on all discharges. Grants for new municipal facilities would be required to use NPDES limits for design. Strict evaluations of infiltration and inflow would be needed. For industrial discharges, a nation-wide set of best practicable control effluent limitations would have to be established by EPA. At this point in time, the Lead-Deadwood project still legally fell under the older Water Pollution Control Act requirements whereby cost-sharing was still allowed between a municipality and industry, but in the 1972 Act, stricter pre-treatment requirements by industry would have to be met, and a system of cost-recovery to the Federal Treasury from any portion of a municipal facility attributable to industry use was required.

EPA was thus required to mediate the extremely difficult problem of dealing with an older grant under new laws and regulations.

e. The Save Centennial Valley Association vs. EPA Lawsuit

Citizens of Centennial Valley and others (such as the City of Whitewood) concerned with possible groundwater contamination from the originally proposed Centennial Prairie project filed suit against EPA on November 14, 1973. The suit charged among other things, that EPA had not fully complied with the National Environmental Policy Act on this project and that the project did not comply with the more stringent requirements of PL 92-500 and other Federal laws.

f. Testimony at the Public Hearing of December 11-14, 1973

EPA intended this hearing to bring out technical information and problems with the Centennial Prairie proposal and to re-examine the other alternatives under NEPA criteria. The District and Homestake Mining Company (HMC) had, however, some time earlier reassessed the entire project. HMC evaluated the geological conditions at a location known as Grizzly Gulch. The land was predominantly owned by Homestake. Geological conditions there turned out to be favorable for a tailings dam location. The strata were mostly pre-Cambrian granites that were must less pervious to groundwaters than the sedimentary formations in Centennial Prairie. Homestake's air shaft for the mine was located there, and very little groundwater flow was encountered. Structurally, the granites were considered an excellent foundation for a dam.

Ponderosa Pine Dominates the Steep, Sunny Slopes of Grizzly Gulch

Another consultant, Bauer, Scheaffer and Lear, (BS&L) was hired by the District to re-evaluate the project. BS&L is nationally known for its land treatment experience, and the intent of hiring them was to arrive at a new plan for managing wastewater in the Lead-Deadwood area. Two of the principals of the firm and the chief engineer testified about preliminary ideas for pre-treatment at Homestake, a land treatment system using waters stored at the Grizzly Gulch tailings reservoir, and a lagoon-storage land treatment system for the wastes from Deadwood at Centennial Prairie.

2. Decision and Resolution

Since a wholly new proposal was being advanced by the District, EPA was in a difficult legal and administrative situation. A lawsuit was in progress, and no clear path was available for administering a grant that straddled two different pieces of legislation. A new proposal almost certainly would fall under PL 92-500 requirements. Whether the old grant could even be retained or would have to be returned was a question raised.

The consultant Bauer, Scheaffer and Lear's plan was not formalized and could not be reviewed at the time. Testimony indicated a lack of thorough consideration of alternatives, especially those involving conventional mechanical systems. No environmental assessment of the effects of placing municipal and mining discharges on steeply forested slopes in a region of little rainfall was available. It was agreed, therefore, that BSL's plan would have to conform to EPA regulations then in effect for facilities plans. A thorough alternatives evaluation, an infiltration/inflow analysis, and an environmental assessment would have to be made and submitted to EPA for review.

Near the Tops of the Ridges In the Grizzly Gulch Area
Slopes are Milder and Open Grassy Areas Can Be Found

C. Alternatives in the Bauer, Scheaffer & Lear Plan and During EPA Review (Jan.-Aug., 1974)

Components of the BS&L plan were submitted during the early part of 1974. EPA responded to the adequacy of the plan and assessment on July 3, 1974. Figure 3 shows a schematic view of the BS&L plan. The plan calls for two separate treatment systems for managing wastewaters within the Lead-Deadwood Sanitary District.

The first treatment system discussed in this report is designed to serve the Homestake Mining Company, the City of Lead, and the Fantail-Whitetail area. Pretreatment of the Homestake Mining Company wastewater is proposed to recover and recycle cyanide used in the gold milling process. The pretreated Homestake wastewater is then pumped to a combination clarifying and tailings pond located in Grizzly Gulch. Lead's domestic waste and stormwater runoff, in addition to Fantail-Whitetail's wastewater, would also be collected and pumped to the Grizzly Gulch clarifying and tailings pond. Final treatment of the clarifying and tailings pond liquid effluent will be accomplished by pumping the wastewater up to the basin periphery to a system of spray irrigation. Final treatment is accomplished by an overland-flow land treatment system.

The second treatment system is designed to serve the City of Deadwood and the communities of Grizzly Gulch, Pluma-Cliff Street, Terraville and Central City. Municipal wastes from these places would be treated in an aerated lagoon at Centennial Prairie. It is proposed that crops in the Centennial Valley be irrigated with the lagoon effluent.

As a basis for design, BS&L calculated domestic flows of 1.74 mgd average for Lead and outlying areas, and 1.28 mgd flows for Deadwood and nearby communities. Homestake industrial flows would be about 5 mgd average. These volumes represent a considerable drop in design flows from the Brady proposal for Centennial Prairie. In part this was due to better data. Throughout the report, the water quality objectives cited were the 1985 "no pollutant discharge" goals of PL 92-500, although no specific treatment design parameters to attain 1983 water quality standards were defined.

Total project capital cost was estimated to be $10,172,000; operation and management costs would be approximately $509,000 annually. An annual revenue of $309,000 from crop production at Centennial Prairie was projected. It was recommended that wastewater be sprayed from the Grizzly Gulch retaining pond to 700 acres of land surrounding the pond. The waste would be sprayed at a maximum average rate (including rainfall) of 0.84 inches per day, over the 720 acres of Grizzly Gulch watershed.

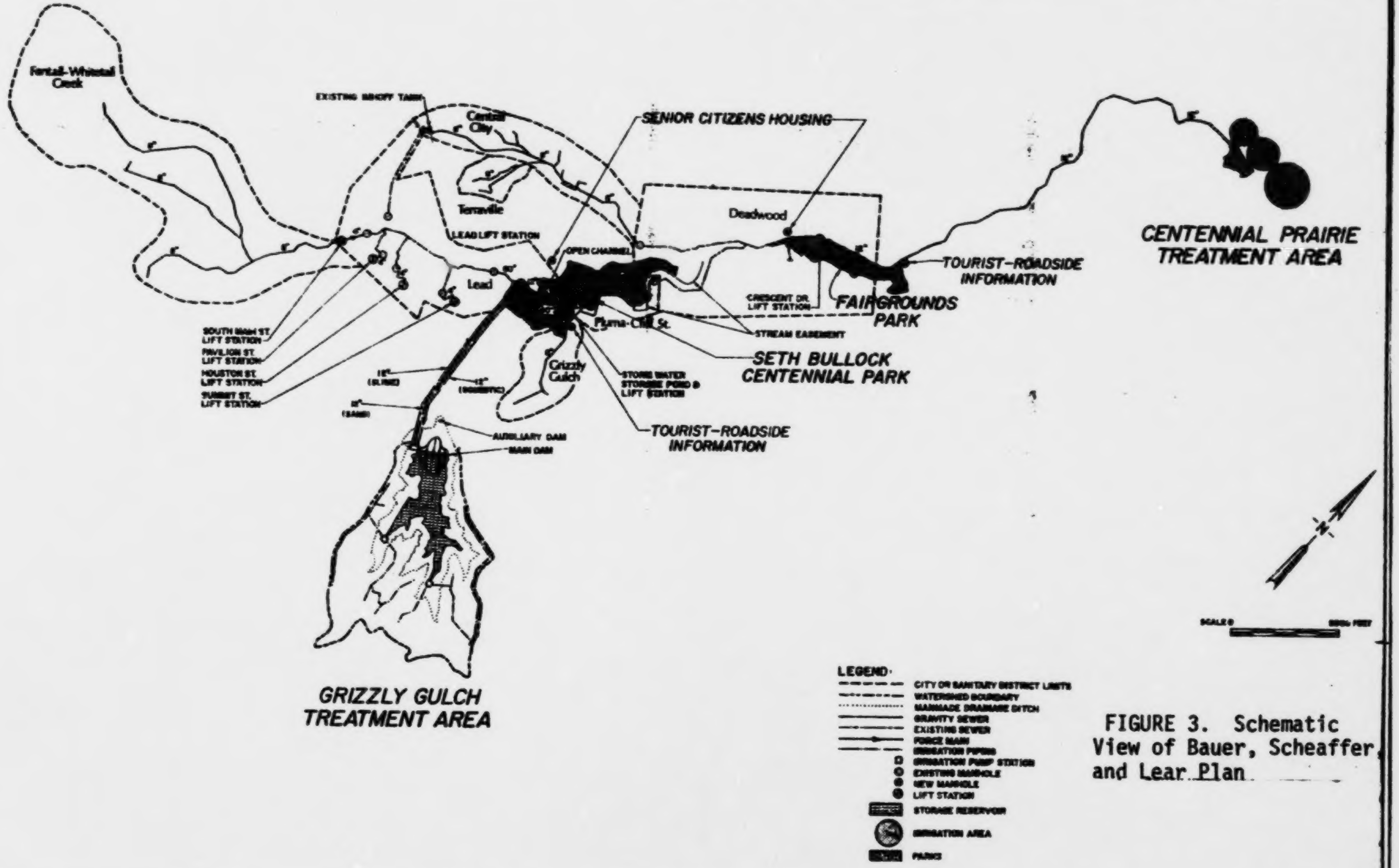

FIGURE 3. Schematic View of Bauer, Scheaffer, and Lear Plan

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An interceptor ditch would be constructed around the retaining pond to convey downstream the water produced by the overland runoff treatment system. A smaller dam downstream of the main Grizzly Gulch impounding dam was to be constructed to intercept seepage from the impounding dam and allow for any necessary treatment.

For the Centennial Prairie portion, a 30-acre aerated lagoon would be constructed at Centennial Prairie to receive the wastes from Deadwood and smaller nearby communities. Lagoon effluent would be sprayed over 135 acres of cropland in Centennial Valley at a maximum average rate (including rainfall) of 0.76 inches per day.

21 alternatives were briefly evaluated in the environmental assessment as shown in Table 3. In the plan document itself and its supplements, seven BS&L alternatives were costed in some detail, along with two "prior plan" alternatives, including the modified Centennial Prairie proposal. Four more alternatives were evaluated in Supplement A, to the BS&L plan. The documents available concentrated on the proposed plan. Very little in the way of treatment objectives, unit process information and details of alternative plans were presented.

Site for the Proposed Grizzly Gulch Tailings Dam Looking Downstream From the Homestake Airshaft

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TABLE 3. ALTERNATIVES CONSIDERED IN THE BAUER, SCHEAFFER AND LEAR ENVIRONMENTAL ASSESSMENT

Alternative Number	Alternative Description	Design Life	Capital Cost	Annual Cost Operation & Maintenance
	COMBINED TREATMENT			
1.	Grizzly Gulch & Centennial Prairie Sites Combined Lead & Homestake Mining Co. waste treatment in Grizzly Gulch, Deadwood and outlying areas treatment in Centennial Prairie	50	$10,062,000	$ 312,000
2.	Grizzly Gulch & [illegible] Sites Combined Lead & Homestake Mining Co. waste treatment in Grizzly Gulch, Deadwood and outlying areas in a mechanical treatment plant	50/20	13,124,000	654,000
3.	Grizzly Gulch Site Combined Lead, Deadwood & Homestake Mining Co. waste treatment in Grizzly Gulch	50	10,074,000	345,000
4.	Downstream Whitewood Creek Site at Meade-Lawrence County Boundary Combined Lead, Deadwood & Homestake Mining Co. waste treatment approximately 8-3/4 miles downstream from Whitewood.	24	15,481,000	85,000
5.	Mountain Meadow Site Combined Lead, Deadwood & Homestake Mining Co. waste treatment approximately one mile east of Deadwood	21	13,639,000	172,000
6.	Spruce Gulch Site Combined Lead, Deadwood & Homestake Mining Co. waste treatment approximately one-half mile southeast of Deadwood	26	14,036,000	260,000
7.	Two-Bit Site Combined Lead, Deadwood & Homestake Mining Co. waste treatment approximately one and one-half miles southeast of Deadwood	21	$10,360,000	$ 226,000
8.	Whitewood Creek Site Combined Lead, Deadwood & Homestake Mining Co. waste treatment approximately two miles downstream from Deadwood	23	24,160,000	122,000
9	Open Cut Site Combined Lead, Deadwood & Homestake Mining Co. waste treatment within the City of Lead	13	9,388,000	219,000
10	Downstream Whitewood Creek Site near Meade-Lawrence County Boundary Combined Lead, Deadwood & Homestake Mining Co. waste treatment approximately five and three-fourths miles downstream from Whitewood	30	24,281,000	85,000
11.	Grizzly Gulch & Deadwood Sites Combined Lead & Homestake Mining Co. waste treatment in Grizzly Gulch, Deadwood and outlying areas to overland treatment near Deadwood.	50	9,990,000	337,000
12.	Grizzly Gulch & Boulder Creek Sites Combined Lead & Homestake Mining Co. waste treatment in Grizzly Gulch, Deadwood and outlying areas treatment in Boulder Creek area	50	10,193,000	336,000

TABLE 3, CONTINUED

Alternative Number	Alternative Description	Design Life	Capital Cost	Annual Cost Operation & Maintenance
	SEPARATE TREATMENT - CITIES			
13.	Lower Grizzly Gulch & Deadwood Sites Domestic treatment for Lead in Lower Grizzly Gulch, Deadwood and outlying areas treatment near Deadwood	20	$ 6,115,000	$ 230,000
14.	Deadwood Site - Physical Chemical Domestic treatment for Lead, Deadwood and outlying areas to physical-chemical treatment near Deadwood, includes storm water management	50	8,410,000	560,000
15.	Centennial Prairie Site Domestic treatment for Lead, Deadwood and outlying areas at Centennial Prairie	50	6,383,000	98,000
16.	Deadwood Site-Advanced Biological Domestic treatment for Lead, Deadwood and outlying areas in a mechanical plant near Deadwood	50	12,143,000	511,000
17.	Mountain Meadow Site Domestic treatment for Lead & Deadwood at Fountain Meadow	21	8,016,000	172,000
18.	Lead & Deadwood Sites Domestic treatment for Lead in a mechanical plant at Lead, Deadwood and outlying areas in a mechanical plant at Deadwood	50	9,049,000	805,000
19.	Lower Deadwood Site Domestic treatment for Lead, Deadwood and outlying areas to overland treatment site below Deadwood	50	5,610,000	148,000
20.	Grizzly Gulch Site Liquid-solid separation for Homestake Mining Co. wastes with transportation plus land treatment	50	$11,686,000	$1,176,000
21.	Lower Grizzly Gulch Site Liquid-solid separation for Homestake Mining Company. Transportation by aerial tramway.	17	5,190,000	504,000

Footnotes:

Provides only secondary treatment.

1. Relevant Factors

It should first be noted that all of the above factors under the previous constellation of alternatives still pertained at this point. Other factors introduced into the situation makes it even more complex.

a. The Economic Picture at Homestake Mining Company

When the original grant on the Centennial Prairie project was approved in May, 1972, Homestake's economic picture was bleak. By mid-1974, however, the situation was quite the reverse. A result of national and international events combined to rather suddenly make gold mining a highly profitable operation.

Data from Englehard Selling Quotations gives a better picture shown in Table 4 below of U.S. gold selling prices:

Table 4

U.S. Gold Selling Prices

Year	Average Price Per Troy Oz.
1970	$ 36.41
1971	41.25
1972	58.60
1973	97.81
1974	161.08

Although gold prices were officially pegged at $35 per ounce since the thirties, a two-tier gold pricing system allowed gold sales to occur at both the fixed price and at free market values. Responding to chronic U.S. balance of payments deficits, worldwide inflation, oil exchanges, etc., the United States first revalued the official price of gold to $38/oz on May 8, 1972, and to $42/oz on September 21, 1973. The free market price, as evidenced by the prices quoted above, took a corresponding jump and has remained generally above $100/oz.

Homestake's corresponding fiscal situation can be seen through the data below in the years 1972 and 1973 from their Annual Report:

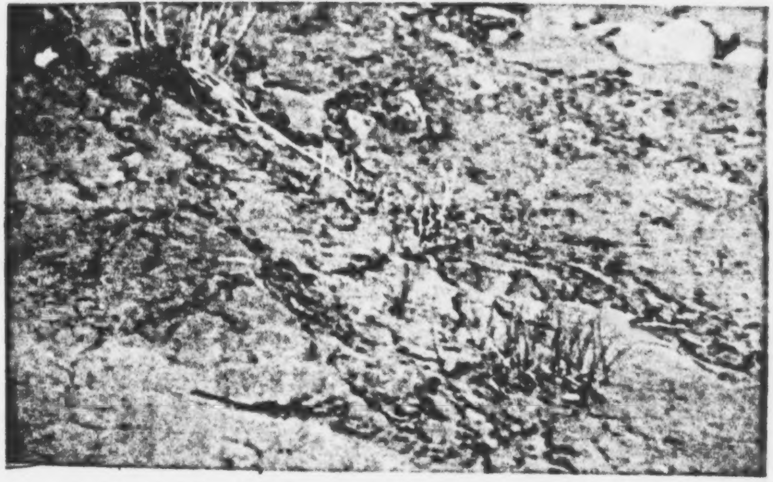
	1972	1973
Tons Mined	1.477×10^6	1.57×10^6
Oz. Gold/Ton	.278	.227
$/oz	$56.73	$93.36
$Value of Gold Sales	$\$23.4 \times 10^6$	$\$33.5 \times 10^6$

EPA felt that with the generally improved economic situation, other factors, particularly environmental and engineering areas, would have to be given higher priority in selecting alternatives and in decisions about cost-sharing.

b. Other Factors Relating to the 1972 Amendments (PL 92-500)

By mid-1974, many of the legislative requirements of PL 92-500 were being implemented by EPA. The State had developed water quality standards for South Dakota consistent with the goals of the Act. On May 22, 1974, the State promulgated water quality standards which, among other things, classified Whitewood Creek as a cold water permanent fishery based on technological feasibility, biological and physical factors. Effluent limitations and in-stream standards consistent with these classifications were also added to State law. Municipal discharges to cold water trout streams would have to meet stringent BOD and suspended solids limitiations (10/10 ppm respectively).

Other parts of the Act specified that if stream standards could not be met, using effluent limitations, additional requirements would be put on discharges along that particular stream segment. Waste-load allocations were thus developed in this case for the upper reaches of Whitewood Creek to meet in-stream ammonia requirements of .6 mg/l and chlorine limitations of .02 mg/l.



Grasses Can Be Seen Thrusting Through The Slate-Grey
Tailings Along Whitewood Creek Near Crook City

Simultaneously, EPA was developing conditions for the NPDES permit to be issued either to Homestake and Lead-Deadwood separately or as a single entity. Since it was not decided what the eventual form of discharge would be, EPA developed points for both conditions (separate or combined). Homestake was determined to be a "major discharger" under EPA criteria, which meant that the permit was to be issued by December 31, 1974.

Allowable concentrations for all potential pollutants and toxic materials were therefore being developed that would satisfy the stringent cold-water fishery criteria. Concentrations permitted had to have a safety factor built in -- in this case, the concentrations that would still allow the desired uses during a 25-year 7-day low flow in the creek. The NPDES permit attached as Appendix C gives an idea of the limitations involved for Homestake and the District, although this permit could still be revised.

Detailed regulations were also developed by EPA to carry out the Title II (construction grant) portion of PL 92-500. A more structured approach to wastewater facilities grants was required, a three step process. Step I, the facilities planning process must be completed before Steps II (design) and III (construction) could be approved. A facilities plan now required a detailed infiltration-inflow analysis, an integrated environmental assessment, and numerous other features of design. Land treatment and reuse must be considered as project alternatives.

Deer Tracks
In the Tailings
Along Whitewood
Creek

c. The Status of the Grant

As the likely cost of the project increased beyond the originally approved $4.78 million dollars, new monies from 1975 fiscal year or later allocations to the State of South Dakota would have to be used. This became a concern to the Secretary of the DEP, since South Dakota's total allocation was only $17.7 million under the formula devised to allocate the $18 billion of PL 92-500 to the States. Other projects in the State would have to be delayed. It was hoped that Congress would authorize more monies for wastewater facilities, but even recent monies authorized by Congress did not improve South Dakota's total funds markedly.

More importantly, EPA regulations required cancellation of older grants where the "scope" of the project had significantly changed. New monies would then be used, but in South Dakota's case, the loss of even $4.8 million dollars would have a severe effect on the wastewater funding program.

d. EPA's Evaluation of the BS&L Plan

EPA organized a task force to evaluate the BS&L plan with particular emphasis on the land treatment aspects of the plan. A nationally known forest hydrologist, Dr. William Sopper of Pennsylvania State University was hired to assist in the evaluation. Richard Thomas, an expert in land application from the EPA Kerr Environmental Research Lab was also engaged.

EPA's concerns about the plan are outlined briefly below:

d.1. Dam Safety and Design - Because of the novel design called for by BS&L, and the difference in opinion of other dam experts (68), EPA expressed reservation about this part of the plan.

d.2 Homestake Pre-treatment - EPA generally concurred with the Homestake in-plant concepts, but stressed the need for pilot studies to more realistically assess actual outputs. Some concern was expressed over re-solution of metals in the tailings storage reservoir, especially in combination with domestic sewage.

d.3. Groundwater Movement at Grizzly Gulch - More definitive soils and geologic data were needed to insure that reservoir water would not bypass the dam structure to adjacent areas.

d.4. "Overland flow"-Based on the design, it was not clear whether the flow would be overland or infiltration percolation. The high rates of application suggested in the BS&L plan could result in piping and runoff from area with resultant lesser treatment.

d.5. Effects On Forest Cover - With the predominance of Ponderosa pine forest, EPA was concerned that saturated soils could drown the existing Pine species. This could lead to windthrow with resulting erosion and loss of treatment effectiveness. An ecological assessment of the eventual slope conditions was needed.

d.6. Soil Properties - There was a lack of soils and hydraulic data for design purposes to gauge loading rates. EPA was concerned with the possibility of massive soil slippage on the steeper slopes.

d.7. Nutrient Use - Forests are not particularly effective users of nutrients, and soluble forms could work through the ecosystem to the surface waters.

d.8. Hydraulic/Hydrological Considerations - Non-uniform slope conditions, variations in rainfall, etc., were not considered in design.

d.9. Interceptor Ditch and Irrigation Field Pipes - Construction of these facilities would disrupt a good percentage of the total application area with potential erosion. The interceptor ditch would probably not intercept all of the applied waters. Land slides could easily block the ditch as designed.

d.10. Land Use - The U.S. Forest Service and Bureau of Land Management were not consulted with regard to use of their lands.

d.11. Centennial Prairie Portion - Although a reasonable alternative, land treatment would require cooperation with local farmers who were at the time suing EPA. Application rates might be somewhat high in view of the short growing season. Drainage control could be a problem with the very deep groundwaters at Centennial Prairie.

d.12. Projection of Wastewater Flows - It was not clear why the change in flow projections from the Brady plan had occurred. Potential infiltration-inflow reductions should be evaluated to reduce costs.

d.13. Analysis of Alternatives - Alternatives were only slightly evaluated. No description of alternatives themselves were provided in any detail. An evaluation of Federal and State standards in effect was needed to define treatment objectives. Conventional treatment systems needed to be better defined. EPA specified a more complete set of alternatives to consider, shown as Figure 4, for both combined and separate HMC and Lead-Deadwood systems.

2. Decision and Resolution

EPA responded to the District on July 3 with its review and the following conclusions:

a. Based on recent geological data, the improvements in Homestake's economic situation, and with the potential size of the Federal grant involved, a much greater consideration of treatment alternatives for this water quality problem is needed.

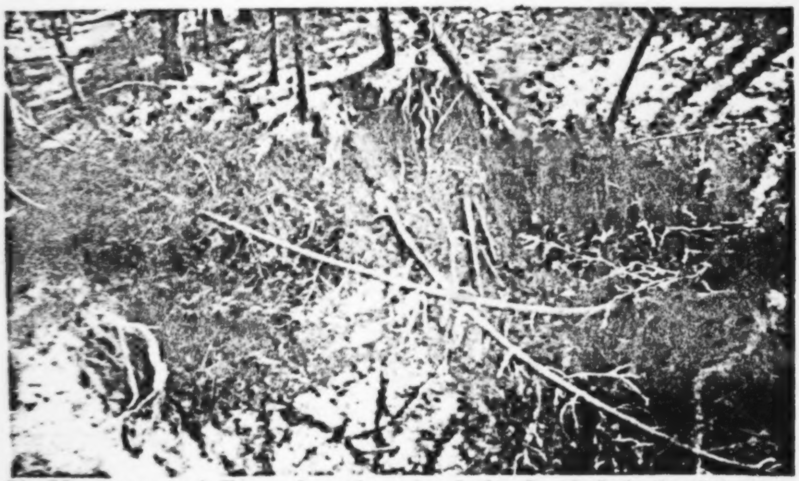
b. Based on the current BS&L plan, EPA could not recommend this alternative as a solution to handling the domestic Lead-Deadwood flows.

c. The Grizzly Gulch tailings dam is felt to be the best solution for Homestake's tailings discharge problem. Tailings and sewage should probably not be mixed for best treatment efficiencies.

d. A number of alternatives including separate conventional wastewater treatment for domestic wastes should be considered. These are specified in Figure 4.

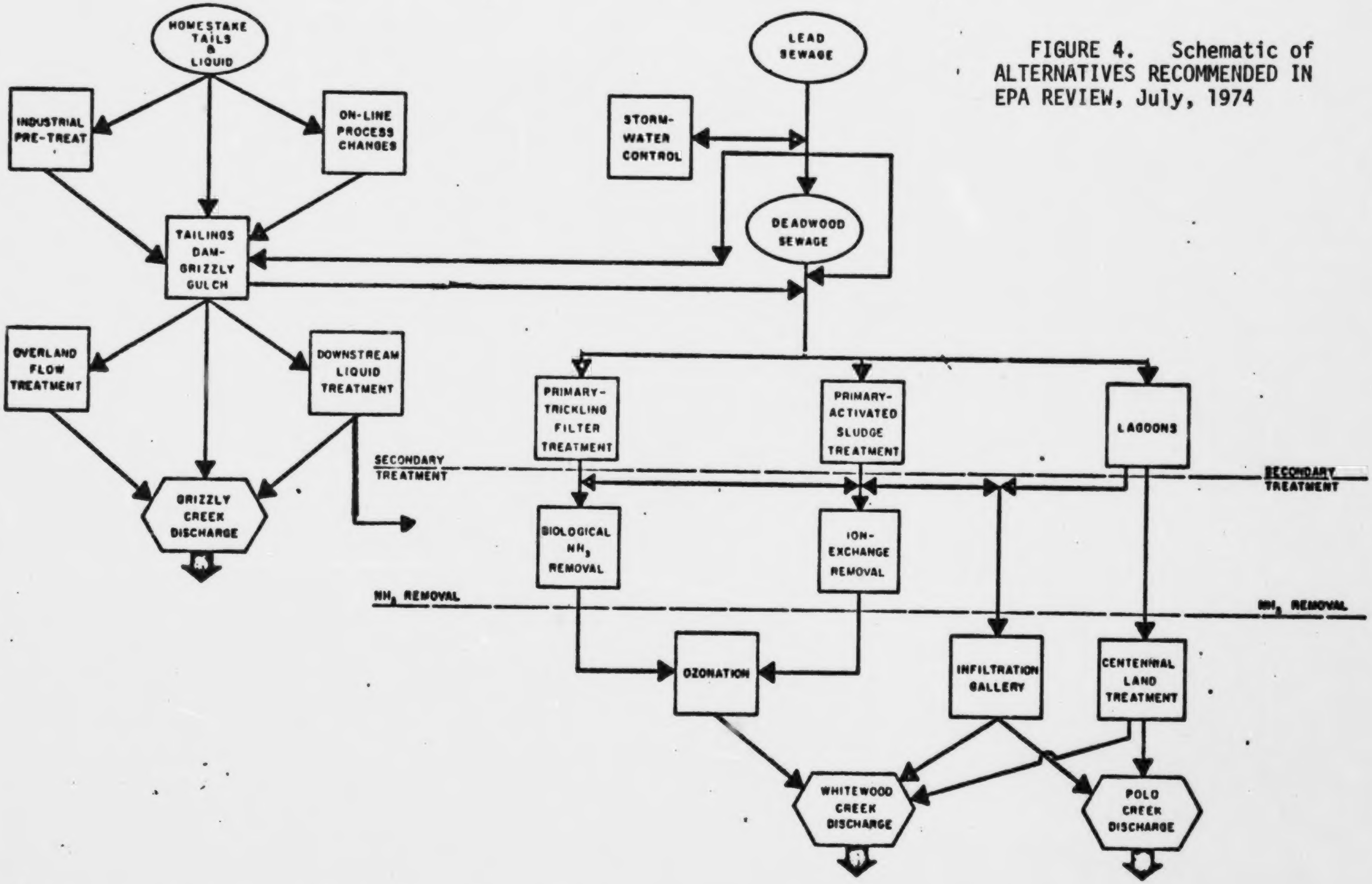
e. An infiltration-inflow analysis must be made for the area.

A meeting was held on July 30, 1974, between EPA, the District, Homestake, Save Centennial Valley Association, the State and other interested parties to discuss these conclusions. A transcript of the meeting is available (88). The conclusion at the termination of the meeting was that a full comprehensive Step I facilities plan under PL 92-500 criteria was needed. On August 15 the scope of the plan and relevant alternatives including some in Figure 4 were defined.



Shallow-rooted Tree Species in Grizzly Gulch Could Be Particularly Susceptible To Windthrow With a Land Treatment Scheme

FIGURE 4. Schematic of ALTERNATIVES RECOMMENDED IN EPA REVIEW, July, 1974



D. Alternatives in the Lead-Deadwood Facilities Plan, (Jan 1975 to Present)

In August of 1975, after the EPA's review of the Grizzly Gulch wastewater management system, CH2M-Hill was retained by the District to develop a formal Facilities Plan and an Environmental Assessment.

The scope of CH2M-Hill's activities defined for this project was considerable. Based on EPA's "Guideline for Facilities Planning", published in January, 1974, CH_2M was required to develop the following information:

1. Develop the water quality criteria for design of any Homestake/Lead-Deadwood system from the myriad of PL 92-500 requirements including State water quality standards, State effluent limitations, Best Practicable Control Technology limitations, NPDES limitations, and BPT as defined for municipal treatment plants. An analysis of the feasibility of meeting these standards was to be produced.

2. An evaluation of the Bauer, Scheaffer and Lear Grizzly Gulch plan, amended because of the removal of Centennial Prairie as a potential site for a treatment system with the settlement of the lawsuit.

3. A wide variety of alternatives (EPA's suggested alternatives in Figure 4 as well as any other feasible systems) was to first be reviewed after meetings with affected parties. The most promising alternatives would be selected for further study and detailed evaluation.

4. A study of industrial pretreatment for Homestake both as a separate and combined capacity was to be made.

5. An evaluation of excessive flows (infiltration and inflow) to the system was to be made. A further survey was to be made if reduction appeared feasible.

6. An environmental assessment for all parts of the facilities plan would be incorporated.

Figure 1 of the CH_2M report (103) on the scope of work shows the flow diagram for the CH_2M study broken down into individual tasks. Reports (103), (104), (105), (106), (113), (114), (115), (117), (130), (144) for these various tasks were produced and are available as reference documents from EPA or the District.

The Facilities Plan study resulted in the development of three rounds of wastewater management alternatives as discussed below.

TABLE 5. COST INFORMATION ON 1st-ROUND ALTERNATIVES IN THE FACILITIES PLAN

PROJECT COSTS AND GRANT REQUIREMENTS
(in dollars)

	LDSD #1		HMC		TOTAL	
SYSTEM	Project Cost	Grant Requirement	Project Cost	Grant Requirement	Project Cost	Grant Requirement
I-A Level 1	9,123,000	7,298,000	4,955,000	-	14,078,000	7,298,000
I-D Level 1	9,971,000	7,977,000	4,955,000	-	14,926,000	7,977,000
I-E Level 1	7,391,700	5,913,000	4,955,000	-	12,346,700	5,913,000
II-A Level 1	11,778,000	9,422,000	6,885,000	2,178,000	18,663,000	11,600,000
II-D Level 1	12,176,000	9,740,000	7,087,000	2,341,000	19,263,000	12,081,000
II-E Level 1	10,570,200	8,456,000	6,767,000	2,084,000	17,337,200	10,540,000
III-A Level 1	12,783,000	10,226,000	7,068,000	5,654,000	19,851,000	15,880,000
I-A Level 2	8,795,000	7,036,000	4,547,000	-	13,342,000	7,036,000
I-D Level 2	9,746,000	7,797,000	4,547,000	-	14,293,000	7,797,000
I-E Level 2	7,171,700	5,737,000	4,547,000	-	11,718,700	5,737,000
II-A Level 2	8,163,000	6,530,000	5,260,000	878,000	13,423,000	7,408,000
II-D Level 2	8,898,000	7,118,000	5,244,000	865,000	14,142,000	7,983,000
II-E Level 2	6,545,700	5,237,000	5,201,000	832,000	11,746,700	6,069,000
I-A Level 3	7,467,000	5,974,000	4,547,000	-	12,014,000	5,974,000
I-D Level 3	8,592,000	6,873,000	4,547,000	-	13,139,000	6,873,000
I-E Level 3	5,517,700	4,414,000	4,547,000	-	10,064,700	4,414,000
II-A Level 3	6,962,000	5,569,000	4,722,000	448,000	11,684,000	6,017,000
II-D Level 3	8,056,000	6,445,000	4,770,000	486,000	12,826,000	6,931,000
II-E Level 3	5,238,700	4,190,000	4,130,000	425,000	9,368,700	4,616,000
IV-A Level 3	13,345,000	10,676,000	4,547,000	-	17,892,000	10,676,000
IV-D Level 3	13,276,000	10,620,000	4,547,000	-	17,823,000	10,620,000
IV-E Level 3	11,759,700	9,408,000	4,547,000	-	16,306,700	9,408,000

First and Second Round Alternatives

By late 1975, CH2M had developed 24 alternative management systems. To meet the NPDES Discharge Permit then in effect for Whitewood Creek, the alternatives had to provide the equivalent of advanced wastewater treatment (AWT). The discharge Permit limitations were based on the State of South Dakota's classification of Whitewood Creek as a permanent cold water fishery. Cost information on the first round alternative is given in Table 5.

A first round or preliminary evaluation was made of the 24 alternatives based principally on economic and legal considerations. This evaluation is documented in Chapter 5 of the Facilities Plan Technical Report. On the basis of this preliminary evaluation, the initial alternatives were pared down to three second round choices:

1. Lower Deadwood Advanced Wastewater Treatment System

This system would treat the District's wastewater in an AWT plant located in lower Deadwood near the rodeo grounds. The plant would provide pretreatment, secondary and tertiary treatment, breakpoint chlorination, disinfection, dechlorination, and sludge handling and disposal facilities. The secondary unit processes would be an activated biological filter system (ABF) and secondary clarifiers. Mixed media filters would provide tertiary treatment with filter backwash storage and treatment facilities. The sludge would be aerobically digested and thickened before disposal in the planned Homestake tailings pond. All relevant water quality standards would likely be met with this alternative.

2. Lower Deadwood Secondary Treatment System

In the Lower Deadwood Secondary Treatment System, the District's wastes would be treated in a secondary treatment plant in lower Deadwood. Facilities in the secondary treatment plant would be similar to those for the AWT plant up through the secondary processes plus the effluent disinfection unit and sludge handling and disposal facilities. This system would not provide any tertiary treatment breakpoint chlorination, or dechlorination.

3. Grizzly Gulch Land-based Treatment System

A land-based system located in the Grizzly Gulch area would be used to treat the combined industrial and municipal flows. The land-based treatment facilities would include a tailings dam, tailings-wastewater storage reservoir, transmission pipeline, and distribution and irrigation systems. The District's wastewater would be delivered above the tailings dam. Homestake's tailings would be delivered through a separate pipeline and would also be deposited above the dam. During the winter the combined wastewater would be stored in the tailings-wastewater storage reservoir. During the summer the wastewater would be pumped to an irrigation site above the reservoir, between Yellow and Whitewood Creeks. A sprinkler irrigation system would distribute the wastewater over the irrigation area. As the wastewater moves through the vegetation and the soil and rock profile, it would be affected by filtration, oxidation, crop uptake, absorption, precipitation, denitrification and ion exchange to provide the needed treatment.

1. Relevant Factors

a. Cost Factors

Table 5 shows the various costs associated with the first round alternative system. The systems are defined in Column I by "Level" as to the treatment level achieved (Level 1 - all standards in effect achieved; Level 2 - intermediate; Level 3 - secondary level of treatment and BPT for Homestake). A thru E reflect a variety of possible infiltration-inflow reduction schemes, while the Roman numerals stand for the type of treatment (I - physical chemical, II - biological, III - land treatment, IV - lagooning).

Two different sets of cost criteria were involved in selection of alternatives for further consideration. From the District's point of view, annual costs to the District were important. A combined system was highly favored by the District because most total annual costs of a system could be borne by the Homestake Mining Company. It was felt that they had the technical capability to operate a wastewater treatment system, whereas the District's capability would have to be brought in and would be directly reflected in total operating costs.Concern was continually voiced by the District that Lead-Deadwood voters would not accept monthly costs of $10 per month or more in any municipal bond vote.

From EPA's and the State's perspective, however, the size of the grant began to become of increasing concern. As the remaining allocations of fiscal year 1974 and 1975 monies were committed to other projects in the State, it became clear that money for a Lead-Deadwood project beyond the scope of the original $4.8 million grant might not be available. The $4.8 million original grant, however, would continue to be available for use on this project only.

b. Environmental Factors

Even with sophisticated levels of treatment under Level 1 designed to meet the stringent criteria, there was some concern by the consultant, CH2M-Hill, whether even these treatment systems would meet all relevant standards.

CH2M had revised the original BS&L plan to accommodate the new condition that no facilities could be built in Centennial Prairie. This condition was part of the out-of-court settlement between Save Centennial Valley Association and EPA in agreeing to terminate the lawsuit. CH_2M felt that a greater land area with lower application rates was needed.

The condition of Whitewood Creek following elimination of the Homestake and Lead-Deadwood pollutant discharges was still felt to be problematic. EPA and State biologists still maintained that a viable fishery could be established in a relatively few years. Others, including personnel for EPA, the State and CH_2M, felt that there was a genuine concern as to how long it would take for tailings now instream to flush out sufficiently for better organisms and for conditions conducive to fish life to be established. The presence of mercury and arsenic in tailings could result in some solubilization and resuspension for a number of years.

The Tailings Lining the Banks of Whitewood Creek Near Crook City may be Tens of Feet Thick. Older Tailings Show a Prominent Color Change From Grey to Reddish Brown

2. Decision and Resolution

As mentioned, the three alternatives were selected for further evaluation. One was a biological system designed to meet standards (a system which involved separate Homestake Mining Company treatment), and a combined Homestake/Lead-Deadwood land treatment system. A lower Deadwood secondary system, which would not meet the discharge standards, was included to provide a benchmark from which to measure the costs and benefits of the two more advanced systems. These three alternatives were given a more detailed or second round competitive evaluation for their engineering, economic and environmental feasibility. This evaluation is presented in Chapter 7 of the Technical Report.

The alternative that appeared to be the most feasible was the Lower Deadwood AWT system. However, all three of the systems were considered unacceptable by either the District, EPA or the State because of one or more of the following reasons:

1. The alternatives would be too costly and would therefore not be approved by the District's residents.

2. All the less costly alternatives involved a lower treatment that would not meet the required effluent limitations. Furthermore, it was questioned whether implementing the treatment level required to meet the effluent limitations would assure the establishment of a cold water fishery in Whitewood Creek because of uncertainties associated with the stream's hydrological data and the unknown effects of the existing tailings deposits.

3. Construction of a wastewater treatment facility in lower Deadwood would be unacceptable due to visual and odor problems characteristic of conventionally designed wastewater treatment facilities.

4. Cost of the Grizzly Gulch land treatment system was beyond Grant capabilities.

Following the second round alternatives evaluation, a draft Facilities Plan report was completed in July 1975 to present the study findings and the selected system. The draft also noted the above concerns about the ability to implement the AWT plant or any system that would meet the required effluent limitations. To alleviate these concerns, the draft report included the investigation of compromise solutions. These compromise solutions would have lower costs but would not meet the set effluent limitations. Implementation of any compromise alternative would require modifying the permanent cold water fishery objective.

Third Round Alternatives

1. Relevant Factors

On the basis of the information in the draft facilities plan, the District sought to get the treatment requirement lowered. Two legal actions resulted. First, the State of South Dakota changed the stream classification of Whitewood Creek below Deadwood from a permanent to a marginal cold water fishery. Second, on March 5, 1976, the State DEP issued an order that waived the water quality objective to allow secondary treatment of the District's wastes with the provision for upgrading the treatment system by July 1, 1988, to meet the cold water fishery objective if future evidence shows that Whitewood Creek will rehabilitate itself by that date.

This order made possible the realistic consideration of lower level treatment alternatives. As a result a third round of two alternatives was developed. A new alternative was introduced called the Grizzly Gulch Lagoon System. The other alternative is the proposed lower Deadwood secondary treatment plant, which was originally a second round alternative. This system has been modified to meet the concerns about visual and odor problems by providing dechlorination and effluent aeration facilities, housing the entire plant in a building, and including odor control equipment to cleanse any odors originating from the treatment facility.

Costs were reduced by revising the collection system to serve fewer households than would have been served under the collection system proposed for the first and second round alternatives. Specifically, planned service to the outlying areas of Terraville, Deer Mountain, Terry Peak/Bald Mountain, and Nevada Gulch/Fantail was eliminated because of the high cost associated with serving a proportionately small number of homes.

The Lower Deadwood Secondary System (LDSS) and the Grizzly Gulch Lagoon System (GGLS) are described in the Administrative Report. The GGLS involved the collection and transport of the District's wastewater to an aerated lagoon and winter storage reservoir in Grizzly Gulch. Effluent from the system would be discharged into Grizzly Creek and would reach Whitewood Creek just above Pluma. Treatment of the District's wastewater would be provided by a 2- to 4-day detention time aerated lagoon located in a side branch of Grizzly Gulch and the 200-day detention time winter storage reservoir located on the main stem of Grizzly Gulch. Effluent disinfection and dechlorination facililities would be provided, although it was not anticipated that operation of these facilities would be needed to achieve the bacterial standards. Sludge handling facilities would not be required.

The GGLS was designed to be expanded and upgraded in a series of steps or phases. A storm collection system and holding pond located in Cub Gulch below Lead could be added at a later date. Capacity in the storage reservoir would be sized to handle the average yearly storm water runoff from the Lead area. Although this system would not be implemented immediately, space would be provided in the Pluma pump station for the addition of more pumping capacity. Another modification could be the addition of other unit processes, both upstream and downstream of the presently planned reservoir system. The dam would be located in such a manner as to provide enough head to lift the waste via an inverted syphon through Deadwood to the Mountain Meadow areas for possible future land treatment. Other land treatment sites above the City of Deadwood and possible in the Grizzly Gulch vicinity could be utilized with a minimal amount of pumping.

For both alternatives it was assumed Homestake would provide its own treatment of process water and tailings material. This treatment would consist of a large tailings dam to be constructed in the upper reaches of Grizzly Gulch above the existing airshaft. Decant water from the tailings pond would be recycled back to the ore processing facilities in Lead and used as sluice water to transport tailings to Grizzly Gulch. Process water from the HMC mill would be treated using a chemical precipitation-filtration system and either reused or discharged to Gold Run Creek. Because the HMC NPDES Discharge Permit imposes extremely high effluent standards, it is anticipated HMC would not discharge but reuse the treated water.

2. Decision and Resolution

Although the Grizzly Gulch lagoon system offered some operating cost savings to the District, the total and grant cost of the system was higher as shown in the Table below.

	GGLS	LDSS
Total Construction Cost	$7.5 to 8.9 million	$4.7 million
Federal Grant Cost	$6.5 to 7.7 million	$4.0 million
Total O & M Cost	$.147 million	$.232 million
Total Annual Cost	$.330 to .366 million	$.346 million

EPA and the State both expressed doubts about the operational reliability of the Grizzly Gulch system. There was considerable doubt whether the ammonia limitations set by the March 5, 1976 decision (3 mg./1 liter) could be met with this system. Because the proposal involved a deep reservoir for treatment, secondary treatment efficiency would also be problematic. On May 8, 1976, the District Board of Directors voted approval of the Lower Deadwood secondary treatment plant alternative. Except for certain specific features such as the type of sludge disposal, EPA and the State of South Dakota DEP concur with this decision as proposed in the facilities plan Administrative Report.

III. DESCRIPTION OF THE ENVIRONMENT

Information on background environmental conditions or the lack of such has played a critical role in the judgements about and decisions on this project. It is simply not possible to include in this EIS all of the relevant information available on one or another environmental factors involved in this study.

The geographically distinct areas that were considered at one time or another for Lead-Deadwood or Homestake treatment systems are identified here along with the available environmental information:

A. Whitewood Creek and its tributaries;

B. Centennial Prairie and other locations for the combined Homestake/Lead-Deadwood Tailings lagoon (Lower Whitewood, Crow Creek, etc.);

C. The Lead and Deadwood area itself, including the Lower Deadwood site;

D. Grizzly Gulch; and

E. The general area of the Black Hills where factors such as climate, precipitation affect one or another project features.

Beginning with the latter, an excellent generalized environmental description of the entire northern Black Hills area excepting the Centennial Prairie and areas below Deadwood is found in CH_2M-Hill's "Basin Environmental Overview" (113).

As part of its task of evaluating the Bauer, Scheaffer and Lear plan, CH_2M developed extensive environmental information on the Grizzly Gulch area. This information was requested by EPA and is critical to proper design of a land-based wastewater treatment system. EPA's evaluation of the BS&L plan (82) identifies where environmental information is needed in designing a land-based treatment system. The CH_2M study presents geologic conditions, climatic data, soils information (including on-site soil borings and comparative data from other Black Hills area), the known hydrology, biological data including sightings of spoor of local fauna, areal extent of various tree species, landslide areas, ownership maps of the area, and groundwater information. The information is available in two separate reports (105, (114). The design of the land treatment follows closely on the environmental parameters developed in the report (soil-water movement, precipitation rates, etc.). Homestake also developed a detailed geologic evaluation of Grizzly Gulch (47), (58).

A description of the Lead-Deadwood area is provided in the facilities plan environmental assessment appended to this EIS. A reading of this document will provide a basic understanding of the area under consideration.

Since the areas of Centennial Prairie and other treatment sites below Deadwood originally considered in the final EIS of March 1972 were formally removed from consideration by the settlement of November 15, 1974 (95), CH_2M did not evaluate these areas. The final EIS (28) provides a brief description of these areas. Since geological and groundwater considerations predominate in the environmental problems involving the Centennial Prairie project, the Hoskins-Western Sondregger report on subsurface geological conditions at Centennial Prairie (42), Perry Rahn's earlier evaluation (13), and Dr. J.P. Gries evaluation in the Brady Engineering Report (20) cover these areas. Testimony by experts at the public hearing on the draft EIS (21) and at the December 11, 1973, hearing reopening, the NEPA process on the project by EPA (62) contain considerable technical debate about local Centennial Prairie and other regional geologic/groundwater conditions. Experimental data that attempted to simulate one or another of the expected soils/geologic conditions at Centennial Prairie with the effluent from Homestake and Lead-Deadwood is found in Colorado School of Mines Research Institute report (66).

In reverse order, the last area of background environmental information of concern is Whitewood Creek. Whitewood Creek because of the magnitude of the pollution problem has a wealth of information about its water qulality and almost no information about water flow volumes measured by the U.S. Geological Survey or a State agency on larger streams. Since Homestake's discharge often constituted the predominant flow in the Creek, data about Homestake's discharge provided base data for a number of stream water quality parameters (particularly cyanide, solids, arsenic, etc.). The State of South Dakota (1), EPA (15), Wright-McLaughlin (5) and EPA again in the NPDES Permit (102) characterized the existing water quality and, to a certain extent, flow in Whitewood Creek or its tributaries. The State report also documented the mercury pollution problems from Homestake's discharge as far as the Cheyenne arm of Oahe Reservoir. The EPA study (15) also identified the location of deposits of tailings in the Whitewood Creek streambed.

Evaluations of a biological nature on Whitewood Creek were conducted by the State (1), Brady (25), Wurtz (54), Colorado School of Mines Research Institute (66), and EPA (111). A number of these studies included bioassay techniques to test mortality rates for a variety of aquatic species.

EPA believes that no useful purpose will be served by reiterating this volume of information. Should specific questions arise about one or another environmental aspects of any of the alternatives, EPA will make its files available to that agency, person or organization so requesting it.

IV. DESCRIPTION OF THE PROJECT

The treatment method selected for this facilities plan is a secondary wastewater treatment plant incorporating some advanced waste treatment features (ammonia removals to achieve a 3 mg/l in-stream level and dechlorination to achieve a .02 total chlorine residual in-streams. The treatment plant is to be located near the Fairgrounds in lower Deadwood.

Collection facilities for parts of Lead, Deadwood and outlying areas are also included. Figure 1 of the Administrative Report shows the general location of proposed collection facilities. A more complete description of the proposed plant, design features, site location and costs is also found in the Administrative Report.

An existing landfill privately owned by J.D. Crowley will be available for sludge disposal. The landfill site shown on Figure 1, has over 1,200 acres available which could allow the use of either land disposal of sludge or disposal in the landfill operation. The District has held preliminary discussions with the operator Northern Hills Sanitation and they have tentatively agreed to accept the sludge from the Lead-Deadwood plant. Approximately two to four thousand gallons of aerobicly digested sludge will be concentrated in an air flotation system prior to transport 17 miles to the landfill site, shown on Figure 1. Between two and four hauls will be required per day depending on the operation schedule and the efficiency of the air flotation sludge thickener. To assure against breakdown, a minimum of two 1,000 gallon trucks will be purchased to allow continuous operation even with one truck out of service. The State of South Dakota has tentatively agreed on the use of this landfill as a sludge disposal site.

Homestake Mining Company's wastewater discharge is no longer considered to be part of the Lead-Deadwood Sanitary District's wastewater flows. Until the completion of the NEPA process on this facilities plan, however, the relationship of Homestake and the Lead-Deadwood Sanitary District should be considered problematic. Homestake is already constructing a tailings storage facility in Grizzly Gulch to store their industrial solid sands and slimes. EPA has not been informed of any further wastewater treatment process additions at Homestake, although EPA believes that some water conservation measures to reduce the volume of the ultimate plant discharge at Homestake are very likely to occur. An adjudicatory hearing on Homestake's NPDES permit is still scheduled to be held. It is not known whether information on Homestake's eventual treatment process and discharge quality will be available during the course of this EIS process.

Stormwater control has been suggested and evaluated by CH_2M for the Lead-Deadwood area to capture and treat the large amount of inflow to the sanitary sewer system occurring during rainstorms. On pages 5-14 through 5-21 of the Technical report, the various alternatives for inflow correction are identified. It was decided to go with Alternative "E", which involves bypassing all flows beyond a certain interceptor design capacity. This was done in part because of the uncertainty and costs involved in the other alternative corrections. As planned now, some raw sewage would be bypassed to Whitewood Creek during more intense rainfall events.

V. ANALYSIS OF ENVIRONMENTAL IMPACTS OF THE PROPOSAL

This section is intended to identify all of the potentially significant environmental impacts associated with the selected alternative in the final facilities plan. The attached environmental assessment evaluates most of the salient impacts and is incorporated here by reference.

The tailings dam at Grizzly Gulch is being independently constructed by the Homestake Mining Company. The environmental impacts associated with this treatment facility are included in this evaluation, however, because this facility is an inseparable part of the total wastewater management solution to water pollution problems in the Lead-Deadwood area. Homestake's long history of cooperation and involvement in the Lead-Deadwood Sanitary District made it imperative that the facilities plan consider all reasonable alternatives involving both HMC and the District.

The evaluation of impacts occurs as follows: Potential impacts, positive and negative, are identified in each facility (the lower Deadwood treatment plant and collection facilities and the HMC Grizzly Gulch facility). Mitigation measures are suggested where reasonable and appropriate. Each facility is evaluated for construction and operational impacts. A summary of the relative importance of these impacts is presented. A final section then summarizes the adverse impacts that essentially cannot be mitigated with this proposal.

A. Lower Deadwood Treatment and Collection Facilities

CH2M's Environmental assessment has identified the predominant impacts of construction. Some 1800 cubic yards of borrow material will have to be hauled to the treatment plant site. Interceptor collection construction in some of the steeper areas of Lead and Deadwood (Central City, South Lead) offer problems involving steep slopes. Erosion and slumping could occur. Noise from trucks, excavation equipment along with dust and air pollution emissions will create disturbance at various points of interceptor construction.

Construction of interceptors along streambeds will create the potential for sediment movement and some damage in tributaries of Whitewood Creek. On one stream reach on Whitewood Creek near Pluma, an existing fishery could be affected. For some time after construction, there will be a loss of vegetation and wildlife habitats along Deadwood Creek and other areas.

The visual impacts of construction over many areas of the District will generally be unpleasant. More importantly, traffic congestion from construction will create some hardships on local residents and tourists because of narrow streets in the District towns.

Construction impacts at the site itself are expected to be minor. Some economic benefit to the area businesses will be felt during the period of expending of construction funds. See page 3-11 of the Assessment for a more detailed economic impact evaluation.

Operational Impacts

The more profound impacts, positive and negative, will occur with the operation of the permanent wastewater treatment facility.

Flood hazard impacts. The plant is to be located in Whitewood Creek floodway. However, the width of the floodway in the vicinity of the Fairgrounds is sufficient to pass large stormflow events. The plant will be conservatively set on ground that will protect up to the 100-year flooding event.

Removal of public health hazard from raw sewage discharge. The predominant effect of this plant will be to remove the 39 identified raw sewage discharges to the Whitewood Creek drainage and treat the sewage to accepted levels. The sewage problem has been masked to a great extent by the bactericidal effects of cyanide as well as by the general unattractiveness of stream and associated odors. However, Homestake's discharge of tailings and pollutants must be eliminated by the Congressionally mandated date of July 1, 1977. Sewage contamination may become and remain a severe odor problem and a public health problem until treatment is established.

Protection of downstream wells. A number of wells are located downstream in the shallow aquifer associated with Whitewood Creek (30). Although sewage contamination is not currently a problem, instream tailings scouring could change some of the deposits. The potential, however slight, still exists for bacteriological contamination of these wells from the domestic sewage. The treatment facility, of course, will eliminate this possibility.

Effects on development of aquatic life instream in Whitewood Creek. Whitewood Creek at present is almost totally devoid of life and affects instream productivity in the Belle Fourche and Cheyenne River. Elimination of Homestake's toxic wastes will allow the possibility for re-establishment of benthic (stream bottom) organisms, plants and, hopefully, cold water fish species. The District's current domestic wastes would still create severe problems for re-establishment of instream aquatic life if left untreated. The currently called-for effluent levels of BOD, suspended solids, ammonia and chlorine may be sufficient to allow re-establishment of a fishery except during low-flow conditions. NPDES permit limits designed to meet State cold-water marginal stream criteria are conservatively designed to protect the most sensitive aquatic organisms during low flow. An exact assessment of future impacts therefore cannot be made because of the probabilistic nature of the exact frequency and duration of natural flows in Whitewood Creek, Homestake's eventual flow discharges, the lengths of time necessary to remove by scouring the tailings now deposited in Whitewood Creek, and the potential for release of some toxic mercury or arsenic compounds in the re-suspended tailings. Only monitoring instream events after discharge from both HMC and Lead-Deadwood facilities has occurred over a period of time will produce the realistic data needed to assess whether Whitewood Creek rehabilitation be achieved.

Development of cyanogen chloride. (Discussed on page 3-4 of the assessment.) Until the collection and treatment systems of both Homestake and Lead-Deadwood are operational, it will not be known whether the cyanide currently measured in Deadwood's domestic waste flows ultimately comes from the Homestake discharge or can be traced to a local source. Realistically, this source should not be a long-term problem, since the cyanide almost certainly comes from a manmade source and can be controlled. If it does continue to be discharged however, the pollutant is extremely toxic to fish.

Effects on streamflow. The Lead-Deadwood collection facilities will transport waste water flows now feeding Whitewood Creek and its tributaries through direct discharge or seepage, to a point below Deadwood. Some part of the local streamflow will be lost through the towns of Lead and Deadwood. The environmental assessment mentions on pages 3-5 that a loss of about 2.3 cfs will occur because of the domestic facilities. Reduction of Homestake's discharge flow, of course, could be more significant (up to 7.5 cfs).

Wildlife and water uses downstream. The type of facilities proposed will allow development of water uses downstream. Potential irrigation, and use of water by wildlife and for recreation are likely. It is conceivable that at some point in the future, the waters could become sources of drinking water. These beneficial impacts, of course, depend upon Homestake's improved treatment to remove tailings and toxic materials. However, the District's treatment will be necessary to develop recreational uses along Whitewood Creek, including such possible activities as "tubing", picnicking and eventually swimming.

Improved land use potential along Whitewood Creek. As first identified by the Bauer, Scheaffer and Lear plan, land areas along the Whitewood Creek could become potentially valuable recreational or real estate development lands. Land prices are bound to rise as effects of the stream clean-up become more obvious.

Secondary impacts. Although the evaluation of secondary impacts on pages 3-13 and 14 of the assessment is quite cautionary, the effects of secondary growth stimulation need not always be negative. EPA is generally most concerned about the negative growth impacts in two cases; a) where problems involving one or more environmental constraints are worsened by further growth and b) where excessively rapid growth puts a strain on existing municipal services and financial capabilities. The former is a problem in large metropolitan areas where for example, more growth can contribute to further air quality degradation; the latter has occurred in some energy development "boom" towns. However, where economic growth produces a general rise in the health and welfare of a community, EPA is willing to opt for the positive economic impacts as well. Although not subject to precise quantification, the introduction of a sorely lacking municipal utility (wastewater treatment) can serve as a moderate stimulus to further economic development. The removal of the FHA mortgage guaranty restriction and the improved aesthetic quality of the entire Lead-Deadwood area with the implementation of the wastewater facilities could make this stimulus a realistic possibility.

Plant Site Impacts

Land use surrounding the treatment plant site could be adversely or beneficially affected. At present, there appears to be little adverse impact expected since the plant is to be located at some distance from motels and the main part of Deadwood. The Fairgrounds is the closest facility. It is believed that with the suggested odor control measures and exterior plant design, the plant will be unobtrusive. No conflicts were identified by EPA investigation between the plant site and future State highway development of Route 85. It is true that industrial development opportunity will be lost at the site, but it is hard to visualize that industrial development would be any more compatible with other existing land uses.

Odors from plant operations will be minimized by enclosing plant facilities, along with destruction of in-plant odors in a controlled ventilation system. Only occasional plant breakdowns and sludge disposal may cause noticeable odors.

Sludge operations. Although not specifically defined in the facility plan, the proposed truck hauling and landfill disposal of sludge will have some negative environmental impacts. Truck hauling will create minor visual and odor problem. Assuming there are two truck hauls a day, the impact on traffic will be slight.

Sludge disposal can create potentially more severe impacts in landfilling. At present, it is envisioned that sludge at roughly 4-5% solids will be hauled. Essentially such sludge has the consistency of water. Sludge is generally mixed with refuse or dirt before incorporation into a landfill to prevent unstable soil conditions and to minimize leaching. The critical relationship of sludge and solid wastes in a landfill depends on their relative amounts. The District's sludge in a large landfill may be hardly noticeable. In a proportionately smaller landfill, it may cause some operating problems. The stability of the aerobically digested sludge will be important; partly digested aerobic sludge could anaerobically decompose at the landfill site, giving rise to offensive odors. This impact will be controlled by the degree of treatment given to the sludge.

Economic impacts of plant operation. The operation of the proposed facility will create some economic hardships for residents of Lead, Deadwood and other communities in the District. The facilities plan currently estimates the cost per household in the District to be $9.82 per month. This is a relatively high cost to pay for wastewater treatment; individuals on low, fixed or slowly rising incomes will be more severely affected. Value-judgements must be made by local citizens whether the improvements to the entire Lead-Deadwood area and to downstream communities adversely affected by the discharges of both Homestake and the municipal areas will offset the acknowledged economic burdens of wastewater treatment.

Lack of sewage facilities for outlying areas (Nevada Gulch, Fantail Creek, etc). Some problems have already been identified in these areas from improperly operating septic tanks. Pollution instream could pose public health impacts to users of water downstream. The District was reluctantly forced to eliminate these areas from sewerage because of the high costs involved in providing service to such few residents. Further monitoring is needed to precisely define the water quality problems in these areas. County and State enforcement action could be taken to require improvement of septic tanks where seepage is known to occur.

The choice of a conventional wastewater facility means that a more energy-intensive approach to wastewater treatment has been chosen. This approach also tends to create a system requiring more skilled manpower. The type of system involving minimal use of both of these would have been some form of lagooning. Lagoon treatment of domestic sewage, however, was eliminated by the complex series of decision-making events mentioned in Section II. Land treatment is generally less energy and chemical intensive; with the Grizzly Gulch system, however, energy pumping requirements to the extremely high elevations needed for land treatment here would to a great extent match energy requirements needed for operation of the mechanical components such as raw sewage pumps and aerators in the proposed system.

The principal chemicals to be used in this facility will be chlorine, sulfur dioxide, occasional polymer coagulants. Since the principal treatment is biological, however, chemical usage is relatively small compared to physical-chemical systems in use elsewhere.

Manpower requirements. The proposed treatment system is fairly complex and will require a number of highly skilled operators (4 to 6). Activated bio-filters in particular need close attention to operate well. A chief disadvantage of the separate treatment system has always been that the District could not make use of the engineering capabilities of Homestake personnel as had been proposed for combined systems.

A Mechanical Advanced Wastewater Treatment Plant near Estes Park, Colorado

B. Grizzly Gulch Treatment System

Construction

In general, the construction of the Grizzly Gulch tailings pond will wreak a profound change on the entire Grizzly Gulch ecosystem. First and foremost, the forest-stream ecosystem in the Grizzly Creek watershed above the HMC airshaft will be permanently altered and for the most part destroyed. Grizzly Creek is now classified as a cold-water permanent fishery; that portion upstream of the airshaft will be eliminated.

Sediment loads on the lower portion of Grizzly Creek and Whitewood Creek will also have a deleterious effect on the fishery there. Construction practices and rainfall events will to a large extent dictate what damage does occur downstream.

The implementation of a 110 acre tailings dam storage area and interceptor ditch does require removal of the existing vegetation. Since the creek is utilized by many animal species for water or habitat (deer, beaver, small rodents, etc.) the immediate impact on the Grizzly Gulch animal populations is undoubtedly devastating. Noise from construction activities will also affect animal populations in the vicinity.

Operational Impacts of Grizzly Gulch Tailings Storage System

To a great degree, the positive benefits of this facility will work in tandem with benefits from implementation of domestic treatment at Lead and Deadwood. The following areas already discussed under the Lead-Deadwood facility would pertain to the Grizzly Gulch operation as well:

a. Removal of a public health hazard.

b. Protection of instream aquatic life in Whitewood Creek.

c. Positive effects on Whitewood Creek recreational, wildlife and future water users.

d. Lowering of instream flows through Lead and Deadwood.

e. Improved land use potential along Whitewood Creek.

It should, of course, be recognized that the effects differ somewhat in downstream improvements depending on the nature of the pollutants removed (tailings, cyanide versus ammonia, bacteria coliform, etc.). Homestake's discharge, of course, is the more critical treatment problem. The sanitary flows themselves would never have created the magnitude of a pollution problem being faced here. A definite assumption cannot yet be made about the quantity and quality of Homestake's waste, except to the extent that only discharges compatible with cold water fishery standards will be permitted. Some reduction in flows to Whitewood Creek is a foregone conclusion; tailings, cyanide and arsenic discharges should be absent. Heavy metals discharges should be close to or at background levels. Given these assumptions, the identified impacts above should begin to take effect in the next few years.

Impacts in Grizzly Gulch. Impacts for the stream ecosystem lying above the airshaft must be considered permanent. The area will be inundated with over 200' of tailings. The fishery in Grizzly Creek below the tailings dam could be maintained if a steady flow regime is established in the interceptor ditch around the tailings dam sediment loads and if nutrient levels are minimized in waters carried through the ditch to the creek. Seepage to Grizzly Creek from the tailings dam could carry one or more toxic pollutants unless carefully controlled.

Each Micro-Watershed Has Its Own Peculiarities of Slope, Drainage, Vegetation, Geology, and Direction that must be Considered in Land Treatment Design

Operation of the tailings dam will be a permanent human intrusion on the Grizzly Gulch natural area. Noise, trucks and other human activity will tend to keep animals at some distance. Deer and other animals may still try to utilize portions of the Upper Grizzly Creek drainage for a water source or possibly the interceptor ditch and even any storage pool in the tailings area itself. It would be expected that some animal fatalities might occur in these areas.

The forest vegetation around the dam should stay essentially in its present form unless Homestake harvests timber in the Gulch. As tailings dry, they can become airborne in windy weather and create occasional nuisance problems. It appears that the dam is located far enough away from human habitation to be a minor problem.

The chief issues to be discussed in connection with the potential loss of much of the natural attractiveness and ecosystem productivity of Grizzly Gulch are its effect regionally both to humans and in terms of the overall Black Hills natural environment.

In terms of losses of natural environmental values, Grizzly Gulch represents a fairly productive, ecologically diverse, small watershed area near the highest points of the Black Hills. Streamflow in Grizzly Creek has been of sufficient quantity and constant enough in flow to be recognized as a cold water fishery. It is not identifiably unique, however; no significant archaeological features or rare and endangered plant or animal species were known to be in the area. There is one known miner's cabin within the tailings area that will be destroyed. The biotic evaluation by CH_2M (the best information available) is still cursory; no systematic quantification of various ecosystem attributes such as productivities was ever attempted. It thus remains somewhat conjectural what the ultimate environmental impact on this area will be.

From the human use standpoint, the loss of Grizzly Gulch may have only a minor impact. The area is basically in private ownership (Homestake). In the past, access to the area along the road parallel to the Creek has been restricted, no doubt to add protection for the airshaft for Homestake's mine. Members of the District indicated that the area was used for occasional picnicking by local residents.

Given the general lack of any extensive recreational use in the past and the absence of any particular attractions, the loss of some 100-200 acres of Grizzly Gulch watershed will have only a minor impact in the Black Hills. Some impact will be felt on BLM and Forest Service administered lands in the vicinity. No specific recreational activities were identified on the tracts of Forest Service lands in the Gulch. There is a campground (Strawberry Hill) to the southeast that could be conceivably affected by the changes in Grizzly Gulch. Given the network of unpaved roads throughout the upper reaches of Grizzly Gulch extending to the campground, users of the campground may occasionally find themselves suddenly removed from the idyllic Ponderosa forest into an intensive industrial operation that would not be generally considered aesthetically pleasing. The overall impacts on human use of the area is expected to be small, however.

Local Groundwater Effects. The possibility exists that some seepage containing contaminants might bypass the tailings dam into Grizzly Creek or local groundwater supplies (Strawberry Gulch). CH_2M evaluated this problem for land treatment and concluded that because of the tightness of non-fractured Grizzly formation, very low opportunity would exist for seepage. A toe train below the reservoir could further capture seepage moving in the fractured Grizzly formation and in the unconsolidated parent materials. The fact that the Grizzly Gulch dam will no longer provide reservoir storage for water will lessen the amount of potential seepage.

Some seepage, however, will occur; the extent of concentrations of metals or other toxic materials in the seepage is not predictable at this point. Monitoring will be necessary to insure protection of Grizzly Creek.

Safety Risk to Downstream Communities. EPA has not evaluated in great detail the present design of the Homestake tailings dam. Since Homestake is building the dam independent of the District actions, design of the dam is Homestake's responsibility. The dam will be of a conventional design, with a rock core for added strength. At this point, EPA can only conjecture that the dam is a safe design (based on past review efforts on safety of the dam under less favorable design conditions of liquid reservoir storage) (47), (68), and represents a minor risk to persons living below the dam.

Economic Impacts. Some increase in operating cost will be felt at the Homestake Company because of operation of the Grizzly Gulch facility. Other liquid stream wastewater treatment will add to the overall costs. Removal of the tailings discharge from the Whitewood Creek will have positive economic impacts to the entire Lead-Deadwood area that will benefit the overall community. The facilities plan has established that annual operating costs for complete treatment could cost Homestake $1.5 million dollars per year.

The following figure attempts to summarize the main environmental impacts occurring as a result of this facilities plan project. Various impacts identified are rated as to their rough order of importance (major, moderate, minor, negligible) and whether they are generally positive or negative. The figure is simply to summarize in an easily recognizable way the principal environmental tradeoffs involved with this project. It should be emphasized that these are subjective ratings, as seen by the EPA staff. Others may see things differently. No attempt is made to quantify these ratings any further in numerical terms; they are a rough order-of-magnitude assessment of the most important impacts.

Figure SUMMARY OF "IMPORTANT" ENVIRONMENTAL IMPACTS

A. Lead-Deadwood Sanitary District Facility	RATING
Construction Impacts	
Movement of 18,000 cubic yard of borrow material.	•
Pipeline construction on steep areas.	⬤
Dust, noise & air pollution from construction.	• *
Sediment damage in tributaries from interceptor construction.	• *
Erosion & slumping in steep areas.	• *
Loss of vegetation and wildlife habitat along streambeds.	•
Effect on fishery near Pluma.	● *
Visual Impacts of construction.	•
Congestion effects	⬤
Economic effects.	∘
Site construction impacts.	•
Operation and Site-related Impacts	
Flood hazard impacts	•
Removal of Public Health Hazard from raw sewage.	◯
Protection of private wells downstream	○
Effects on in-stream aquatic life development.	•–○
Effects on stream recreation use.	◯

* Depends on proper mitigation techniques

KEY TO RATING SYSTEM

IMPORTANCE	IMPACT	
	Positive	Negative
Major	◯	⬤
Moderate	○	●
Minor	∘	•
Negligible	·	·

	RATING
Effects on in-stream life during storm events.	• – ●
Development of cyanogen chloride	• – ●
Effects on stream flow.	•
Wildlife impacts downstream.	∘ – ○
Water uses (irrigation, recreation) downstream.	◯
Odors from plant operation.	•
Qualification for FHA financing.	○
Secondary Impacts (Growth, new investment).	∘ – ○
Land use at plant site.	• – ∘
Economic impacts of operation.	●
Sludge Disposal impacts - hauling.	•
Sludge Disposal impacts - land fill.	• – ●
Use of non-renewable resources.	•
Chemicals, energy, manpower requirements.	• – ●
Lack of sewage facilities for outskirts.	• – ●
Improved land use potential along Whitewood Creek.	○

B. Grizzly Gulch (HMC) Facility

Construction Impacts

Visual impacts	●
Effects on vegetation	• ●
Effects on wildlife	●
Dust, noise, air pollution.	•
Sediment drainage on tributaries.	• ●
Economic Impacts	∘
Stream ecosystem	●

Operation Impacts	RATING
Removal of public health hazard (sewage, C_N-, heavy metals, arsenic)	○
Protection of wells downstream	○
Effects on Whitewood Creek instream aquatic life development.	○
Effects on Grizzly Gulch Creek aquatic life.	● •
Effects on stream recreation use, downstream wildlife uses.	○
Effects on downstream water uses.	○
Effects on stream flow.	●
Effects on local vegetation.	●
Effects on local wildlife.	• ●
Economic impacts of operation.	●
Local groundwater effects.	• ●
Safety risk to down-stream community.	•
Improved land use potential along Whitewood Creek.	○
Regional impacts from Grizzly Gulch loss on humans.	•

VI MITIGATION MEASURES

Based on the work done in the environmental assessment and the present impacts evaluation, the following mitigation measures are suggested:

A. Lead-Deadwood Sanitary District Facilities

Construction

A geotechnical investigation along pipeline corridors, pump station and plant site to identify and avoid sensitive geologic areas.

Unstable slope areas should be avoided.

Borrow area should be chosen to minimize impacts.

Sedimentation effects can be minimized by paralleling roadways rather than streambeds.

Construction should be staged to minimize impact on tourists, traffic congestion, wet season, and spawning seasons at Pluma.

Congestion effects can be minimized by leaving one lane open on the street affected.

Operation

Effects of stormflow bypasses could be minimized by curtailing use of tailings and salt for snow control in favor of sand.

An ordinance to prohibit toxic wastes is needed to prevent plant upset.

A monitoring program of both water quality and biotic development is needed to measure re-establishment of a Whitewood Creek fishing. This would probably have to be done in conjunction with Stateand EPA monitoring.

Low flow conditions could be improved if Homestake could continue to divert some out-of-basin water during those periods for in-stream benefits.

Odor problems can be minimized at the plant with the suggested odor control system, closed plant design, and an ordinance prohibiting toxic wastes from entering the plant.

Land use conflicts can be minimized at the plant by an aesthetically pleasing design.

Effects on parking at the Fairgrounds could be made positive by allowing some parking in the plant vicinity for Fairground events.

Sludge disposal effects at a local landfill can be controlled by careful planning. Sludge should be in the best form (concentrated, stabilized) to mix with refuse. Planning should take account of sludge/refuse or soil ratios to avoid unnecessary soils settling and leaching. If necessary, vacuum filters should be considered for the plant to aid in drying sludge before disposal.

Economic impacts can be minimized substantially in final plant design. The simplest, most reliable unit processes should be chosen, and ones that minimize the need for skilled operators.

Water quality impacts from improper operation of outlying area septic systems can be minimized by monitoring and enforcement where necessary by the County or State. Remedial actions on some septic systems may be needed.

B. Homestake-Grizzly Gulch Operation

Effects on Grizzly Creek aquatic life can be minimized by careful installation of the drains and monitoring of seepage from the tailings dam.

Streamflow impacts could be lessened if Homestake could release some waters diverted from outside the basin for flow augmention purposes. This may create water rights problems during dry years, however.

If losses of wildlife were to occur in the tailings pond operation, fencing might be necessary to prevent animals from entering the interceptor ditch and tailings storage area.

Ultimate use of the area once the tailings operation is completed could be improved by addition of organic materials to the tailings surface. If possible reclamation should be performed in conjunction with the filing of the tailings pond.

VII ADVERSE IMPACTS THAT CANNOT BE AVOIDED

Some construction impacts will occur and cannot be mitigated -- odors, noise, disruption, slumping -- In general, all such impacts are short-term. Presuming construction will take approximately 1 - 1.5 years for the Sanitary System, the period of Spring 1977 through late fall 1978 will bear the brunt of the impacts. Localized street impacts, of course, are much shorter and run on the order of a week to a month.

Plant operation will result in permanently increased activity in the lower Deadwood vicinity. Occasional odors and truck operations will prove annoying to some persons. The present system will discharge mixtures of rainfall and sewage during the infrequently occuring intense rainfall events. Some damage to aquatic life is likely to occur, but at this point must still be considered problematic.

The present treatment scheme will occasionaly produce poor quality effluent during plant upsets, but the frequency can be controlled to a great extent by good operation and control of influent sewage characteristics.

Even with the plant effluent as proposed, some impairment of stream life could occur in the short term over an effluent having a higher quality. The unknowns in the stream rehabilitation make it problematic how important such an impact would be.

There will be a streamflow reduction that may affect low flow conditions with collection of sewage and treatment at a downstream facility and the elimination of most of Homestake's discharge. The net inflow of municipal water and water for mining operations from other basins, however, still represents an improvement over that would be the likely historical situation.

Finally for the District, the most painful adverse impact is the cost to its members of approximately $9.82 per household per month for the operation of this plant.

The operation of the Grizzly Gulch tailings storage facility, of course, means the drastic alteration of the entire Grizzly Gulch area, total destruction of the Upper Grizzly Creek ecosystem of about 110 acres, and the potential impairment of the Lower Grizzly Creek cold-water fishery. The danger, however small, of dam failure is also something that cannot be avoided.

VIII THE LONG TERM IMPLICATIONS

Short term impacts versus long term productivity, irreversible commitments, and the longer range NEPA view are discussed in this section.

EPA was created to bring together under one roof and make more effective the application of environmental laws in effect. Later legislation such as PL 92-500 has added considerably more legal authority and responsibilities to EPA's tasks. EPA must put into action the goals and aims of the laws as Congress intended.

In this case, older water pollution legislation identified the need to clean up polluted waters primarily with the goal of protecting public health and welfare. Funds were set aside to assist municipalities in solving such public health problems and industries in conjunction with municipalities where this seemed feasible. The original grant for the Centennial Priaiie facilities of course, had this in mind.

PL 92-500 created a much more specific method to accomplish the older water pollution goals. Congress, of course, set even loftier water quality goals in this Act to make the nation's waters swimmable and fishable in some very tight time frames (approximately 10 years from passage of the Act). A more rigorous total approach to control of existing sources of pollution was set out. Specific stream criteria to achieve the desired uses, a system of effluent limitations or discharges to achieve the criteria in the stream, and an enforceable permitting system were devised to carry out these goals. Separate industrial treatment was to be desired. 18 billion dollars was set aside for municipal treatment to meet these standards.

Thus the direction has changed as to what goals EPA should be carrying out and how. For the residents of Lead-Deadwood, Homestake, the Congressional action means a somewhat greater financial burden in maintaining this desired water quality.

The positive benefits for the Homestake and Lead-Deadwood clean-up have been identified earlier. The long term productivity of the area should improve with the development of a pleasant stream that can be used for recreation activities. At present, the stream is a detriment to the community and certainly no tourist attraction. Odors from the stream are obvious, and the general appearance is unsightly. To residents of the towns themselves, some improvement in their own quality of life should be realized. Should stream improvements create an increased demand for land along the stream and with the lifting of FHA restrictions, added economic growth could occur in the Lead-Deadwood area.

The long term benefits for the western South Dakota river systems are more profound. Some additional use of Whitewood Creek water along the Creek itself is likely for irrigation and perhaps even a drinking water supply. The Belle Fourche aquatic regime should markedly improve. Some improvements to the Cheyenne River itself should be noted in water quality. No other single wastewater project in South Dakota offers the potential improvement in water quality over such a large area.

With the present project, Homestake and Lead-Deadwood are essentially irreversibly committed to separate treatment of their wastes with some increase in treatment costs to both parties. The Grizzly Gulch area will be sacrificed to a great extent to improve the conditions in Whitewood Creek. There is no solution to the tailings disposal problem that does not involve considerable environmental cost. As a standard of comparison, the loss of environmental anemities in Grizzly Gulch must still be considered "less harmful" overall than a similar project in Centennial Prairie. The Bauer, Scheaffer and Lear land treatment plan and the revised CH_2M version was not implemented in the last analysis because of funding limitations. The land treatment scheme with suitable design and operational control could have worked successfully and produce effluents equal to or better than what is now contemplated. For this particular situation, the potential for landslides would have continued to be a risk associated with the project. The monies to build the project were simply not available to South Dakota at this point in time or in the foreseeable future.

One other risk factor needs to be stated: rehabilitation of Whitewood Creek to cold water fishing standards is still problematic. With limited funds available, the State and EPA had to weigh the risk of funding to meet cold water fisheries immediately at higher cost and not having the stream rehabilitate itself, against the option of spending less Federal funds to reach an intermediate level of treatment and see the results in the stream over time. The State chose the latter approach and EPA concurs.

The National Environmental Policy Act requires a "balancing" of environmental values with traditional engineering/economic values in Federal decision-making. EPA feels that this EIS effectively documents this tradeoff of environmental, economic and engineering concerns. Whether EPA made the "right" decisions in such a complex set of circumstances is debateable. There should be little argument that environmental data and choices of one environmental option over another played an important role in the final choices made on the facilities plan.

IX PUBLIC AND AGENCY INVOLVEMENT

Public and other agency involvement in this project has been extensive. Many public hearings over five year's time have been held on this project. State actions have been closely coordinated with EPA activities. A reading of the chronology of events in Appendix A will spell out interactions of all parties involved in this project.

REFERENCE DOCUMENTS AND CHRONOLOGY OF EVENTS INVOLVING LEAD-DEADWOOD/HOMESTAKE WASTEWATER TREATMENT FACILITIES

Reference Number	DATE	ACTIVITY
1	1960	South Dakota State Department of Health, Division of Sanitary Engineering (Pierre, South Dakota) Report on gold recovery wastes, Homestake Mining Company. (Early study identifying wastewater characteristics and industrial parameters at Homestake gold plant)
2	1964	Greely and Hansen Engineers (Chicago, Illinois). Homestake Mining Company: Report on sewage and industrial waste, collection and treatment. (Wastewater planning study recommending combined industrial/domestic pond)
3	1965	South Dakota Department of Game, Fish and Parks. Pollution of the Belle Fourche and Cheyenne Rivers. (Analysis of biota, flows extent of pollution in Whitewood Creek as a basis for stream classification)
4	1967, Jan.	Kirkham, Michael and Associates (Rapid City, South Dakota). Study and report, waste collection and treatment facilities, Homestake Mining Company, Lead-Deadwood, South Dakota. (Testing and analysis to determine design criteria for a combined HMC/Lead-Deadwood treatment system. Sites for a pond are evaluated (Centennial Prairie and Mountain Meadow). Flows and effluent limits are defined.)
5	1967	South Dakota Legislature passes SDL 4625 - Water Pollution Control Legislation. (Whitewood Creek classified as "B", no specific stream criteria in effect).
6	1968, Mar. 15	Two-tier gold market established by IMF members (free-floating open market plus fixed currency rate gold prices.)

Ref. No.	DATE	ACTIVITY
7	1969, Apr.	South Dakota State Legislature forms the Lead-Deadwood Sanitatary District.
8	1970	Ferguson-Meador and Associates, Inc. (Rapid City, South Dakota). Preliminary study of mine tailings, Lead-Deadwood Sanitary District, Deadwood, South Dakota. For Brady Engineering Company, Spearfish, South Dakota. (Evaluation of HMC tailings for using mine wastes for dam construction and subsurface soil evaluation at Centennial Prairie).
9	1970, Dec. 20	Homestake discontinues use of mercury in gold amalgamation circuit.
10	1970, Dec. 31	The Environmental Protection Agency is formed under Executive Reorganization from various Federal agencies -- FWQA, NAPCA, etc.
11	1971, Apr. 12	Lead-Deadwood Sanitation District applies to Kansas City office of the Federal Water Quality Administration for Title 8 Water Pollution Control Grant (33% of cost paid for by grant).
12	1971	Brady Engineering Company (Spearfish, South Dakota). Preliminary engineering report, wastewater treatment facilities, for Lead-Deadwood Sanitary District No. 1, Lawrence County, South Dakota. (Engineering study forming the basis of Lead-Deadwood Sanitation District. Study evaluated alternative methods, cost payment and project financing. Study recommended combined industrial tailing/domestic wastewater pond at Centennial Prairie). Five sites evaluated.
13	1971, Jan. 1	Rahn, Perry, Hydrogeology of The Proposed Wastewater Settling Pond in Centennial Valley. (Evaluation of geological situation in Centennial Prairie - leakage into aquifers. Report identifies sinkholes, outcrops of Minnekahta and Minnelusa aquifers at proposed damsite. Recommendations made to seal various leakage areas).
14	1971, July	Region VIII Office of EPA formed. Files of FWQA in Kansas City transferred to Denver for this project.

Ref. No.	DATE	ACTIVITY
15	1971, Oct.	EPA Conference on Pollution of the Cheyenne River held at the request of the Governor of South Dakota. Technical Report issued by EPA NFIC - Conference Proceedings Oct. 1971. (Recommendations made to construct Centennial Valley project by November 1, 1973. Other recommendations to develop interim solutions and investigation of wellwater pollution Along Whitewood Creek).
16	1971, Oct.	Homestake Mining Company applies to EPA and Corps of Engineers for an 1899 Refuse Act Permit.
17	1971, Nov.	Brady Engineering Company (Spearfish, South Dakota). Proposed storm flow design criteria, Lead-Deadwood Sanitary District wastewater project.
18	1971, Dec. 6	EPA circulates Draft Environmental Impact Statement on project. (EIS recommends funding of Centennial Prairie wastewater pond).
19	1971, Dec. 17	EPA receives Hydromation Filter Report (Evaluation of industrial-mechanical treatment process at Lead-Deadwood and Homestake)
20	1971, Dec.	Brady Engineering Company (Spearfish, South Dakota), 1971. Supplemental geologic and hydrologic report, preliminary engineering report wastewater treatment facilities, for Lead-Deadwood Sanitary District No. 1, Lawrence County, South Dakota.
21	1971, Dec. 21	EPA Public Hearing on Draft EIS at Deadwood (Transcript and written testimony available from EPA. Chief objections from Centennial landowners about groundwater/pond operation).
22	1971, Dec. 20	Hyland, John, EPA Industrial Wastes Evaluation Section Cincinnati to EPA Region VIII. (Comments on cyanide and heavy metals chemistry Centennial pond operation).

Ref. No.	DATE	ACTIVITY
23	1971 Dec. 28	EPA field trip to Centennial Prairie/Lead-Deadwood area.
24	1972, Jan. 21	Wayman, Cooper (EPA Region VIII staff) memorandum (Evaluation of cyanide chemistry in Centennial proposal)
25	1972, Fed.	Brady Consultants, Inc. (Spearfish, South Dakota). Feasibility of providing interim treatment for Lead-Deadwood Sanitary District No. 1, Lawrence County, South Dakota.
26	1972, Feb. 23	Homestake adds "Carbon-in-Pulp" cyanidation circuit to recover gold and announces decision to close Deadwood slime plant.
27	1972, Feb. 28	Meggs, T.O., (EPA-NFIC), memo to Region VIII(review of cyanide chemistry on project).
28	1972, Mar.	Region VIII (Denver, Colorado). March 1972. Final environmental statement Lead-Deadwood Sanitary District No. 1, South Dakota project no. WPC SD-200. (Recommended Centennial Prairie Project)
29	1972, Mar. 18	Rouse, J.V. (EPA-NFIC) memo to Director (Comments on tailings pond operation, groundwater seepage, chemistry).
30	1972, Mar. 27	South Dakota School of Mines releases test data on domestic wells in vicinity of Whitewood Creek. (Reports Hg, As, and cyanide concentrations).
31	1972, April	Homestake Mining Company Report, Homestake milling practices, new carbon-in-pulp slime cyanidation circuit.
32	1972, Apr. 24	EPA makes grant offer of $1.79 million dollars to Lead-Deadwood Sanitary District. (Conditions were attached to grant including minimization of seepage from lagoon, pre-treatment, if necessary).
33	1972, May 2	LDSD accepts grant offer.
34	1972, May 8	Official U.S. price of gold revalued from $35.Oz/ and to to $38./ounce.

Ref. No.	DATE	ACTIVITY
35	1972, June	Brady Consultants, Inc. (Spearfish, South Dakota). June 1972. Functional plan and design review information, waste treatment facilities, for Lead-Deadwood Sanitary District No. 1, Lawrence County, South Dakota.
36	1972, June	Brady Consultants, Inc. (Spearfish, South Dakota). 1972. U.S. Highway 85 relocation user benefits north of Deadwood, South Dakota.
37	1972, Sep.	Lead-Deadwood Sanitary District awarded condemnation rights to Auer property in Centennial Prairie (State of South Dakota Eight Judicial Circuit).
38	1972, Oct. 18	Passage of P.L. 92-500 (Water Pollution Control Act Amendments) (Set more rigorous planning, grant, design and enforcement conditions that would affect LDSD).
39	1972, Nov. 13	EPA Region VIII Regional Counsel, opinion on responsibilities of Section 8 grantees (older water policy control act) under new PL 92-500 requirements.
40	1972, Dec. 15	Lead-Deadwood Sanitary District requests grant increase from EPA from 33% to 75% as authorized under PL 92-500 for older grants.
41	1972, Dec. 29	EPA awards LDSD a grant increase to $4.78 million dollars (Total grant)
42	1973, Mar.	Hoskins, Western, Sondregger, Status Report -- Geology of Centennial Prairie prepared for Brady Consultants, Inc. (Detailed problems with Spearfish sinkhole cavern formations. Recommended looking at alternative sites).
43	1973, Apr.	U.S. Environmental Protection Agency, Technical Support Branch, Surveillance and Analysis Division, Region VIII (Denver, Colorado). Mercury, zinc, copper, arsenic, selenium, and cyanide content of selected waters and sediment collected ALONG Whitewood Creek, the Belle Fourche River, and the Cheyenne River in western South Dakota, December 1971-Oct. 1972.

Ref. No.	DATE	ACTIVITY
44	1973, Apr. 6	Save Centennial Valley Association requests EPA to reopen NEPA case because of lack of detailed information about site conditions.
45	1973, June	Dames and Moore (Denver, Colorado) Preliminary report of feasibility study, proposed tailings disposal system, Lead-Deadwood, South Dakota, for Lead-Deadwood Sanitary District No. 1. (Identifies problems with Centennial; reveals "Two-Bit site" Concludes separate HMC/Lead-Deadwood the most economical)
46	1973, June 29	Brady Engineering submits revised cost estimates of project at Centennial Prairie (12.4 million versus 6 million total.)
47	1973, Jul. 10	Dames and Moore (Denver, Colorado). Letter to Mr. James O. Harder, Homestake Mining Company, Lead, South Dakota. Re: Preliminary construction cost estimate tailings disposal system. Grizzly Gulch site, near Lead, South Dakota for Homestake Mining Company. (Evaluates preliminary tailings disposal system at Grizzly Gulch; geology suitable).
48	1973, Aug. 16	Public meeting at Rapid City between EPA, State, Lead-Deadwood, S.D. HMC, Save Centennial Valley, (Discussion of Centennial Prairie problems).
49	1973, Sep. 7	USBR sends conclusions on Centennial project to EPA. (Finds structure to be feasible. EPA hired USBR to evaluate problem in June 1973)
50	1973, Sep. 21	Price of Gold revalued to $42 per ounce under P.L. 93-110.
51	1973, Oct. 5	Meeting between EPA and State to discuss Centennial findings.
52	1973, Oct. 30	EPA Regional Counsel notifies interested parties that EPA will reopen hearings on Centennial Prairie project under the National Environmental Policy Act.
53	1973, Nov.	Wright-McLaughlin Engineers (Denver, Colorado). Preliminary report - Whitewood Creek gaining or losing character - for Homestake Mining Company, Lead, South Dakota.

Ref. No.	DATE	ACTIVITY
54	1973, Nov.	Wurtz, Charles B. (Philadelphia, Pennsylvania). November 1973. *Bioassay studies of Homestake Mining Company effluents in July 1971*.
55	1973, Nov. 14	EPA submits supplement to final EIS in the Federal Register. (Cites problems and desire to re-evaluate alternatives to project).
56	1973, Nov. 14	Save Centennial Valley Associates files lawsuit against EPA. (Basis of suit inadequacy of EIS under NEPA and lack of compliance with PL 92-500 requirements).
57	1973, Nov. 17	EPA notifies public of public hearing on NEPA process.
58	1973, Dec.	Homestake Mining Company (Lead, South Dakota), *Geology of Grizzly Gulch, Lawrence County, South Dakota*.
59	1973. Dec.	Hoskins-Western-Sonderegger (Lincoln, Nebraska). *Preliminary evaluation downstream Whitewood area*.
60	1973, Dec.	Wurtz, Charles B. (Philadelphia, Pennsylvania) *A biological survey of Cheyenne River headwaters in July 1971*.
61	1973, Dec.	Brady Consultants, Inc. (Spearfish, South Dakota). *Preliminary engineering report wastewater collection facilities, for annexed areas, Lead-Deadwood Sanitary District No. 1, Lawrence County, South Dakota*.
62	1973, Dec 11-13	Public Hearing at Deadwood on Lead-Deadwood project under reopened NEPA process. (Transcript of hearing available from EPA. Two primary issues: problems involving Centennial Prairie and presentation of a new plan by Bauer, Scheaffer and Lear).
63	1974, Jan.	Bauer, Sheaffer and Lear, Inc. (Chicago, Illinois). *A plan for the rehabilitation and environmental repair of Gold Run and Whitewood Creeks, South Dakota - for Lead-Deadwood Sanitary District No. 1, Lawrence County, South Dakota*. (Land treatment plan at Grizzly Gulch and Centennial Prairie combining Homestake and Lead-Deadwood wastes).
64	1974, Jan.	Bauer, Sheaffer and Lear, Inc. (Chicago, Illinois). *Supplemental report to a plan for the rehabilitation and environmental repair of Gold Run and Whitewood Creeks, South Dakota - for the Lead-Deadwood Sanitary District No. 1, Lawrence County, South Dakota*.

Ref. No.	DATE	ACTIVITY
65	1974, Jan. 11	EPA letter to LDSD. (Emphasizes that all feasible alternatives for wastewater treated in the area must be considered).
66	1974, Jan.	Colorado School of Mines Research Institute (Golden, Colorado). *Investigation of the Gold Run Creek outfall water, Lead-Deadwood Sanitary District No. 1*. (Evaluates effluent characteristics and treatment efficiencies at Centennial project).
67	1974, Feb.	Bauer, Sheaffer and Lear, Inc. (Chicago, Illinois). *Second supplementary report on a plan for the rehabilitation and environmental repair of Gold Run and Whitewood Creeks, South Dakota* - Lead-Deadwood Sanitary District No. 1, Lawrence County, South Dakota.
68	1974, Feb. 14	Dames and Moore (Denver, Colorado). Letter to Mr. Lawrence F. Jeffries, Manager, Lead-Deadwood Sanitary District No. 1. Re: Review of Bauer, Sheaffer and Lear plan for the rehabilitation and environmental repair of Gold Run and Whitewood Creeks, South Dakota. (Difference of opinions with BS&L about dam design).
69	1974, Feb. 16	Wright-McLaughlin Engineers (Denver, Colorado). Letter to Mr. Lawrence F. Jeffries, Manager, Lead-Deadwood Sanitary District No. 1. Re: Review of wastewater management plan for Lead-Deadwood and Homestake Mining Company. (Generally affirmative of BS&L plan).
70	1974, Feb. 19	First National Bank of the Black Hills (Deadwood, South Dakota). Letter to Mr. Lawrence F. Jeffries, Manager, Lead-Deadwood Sanitary District No. 1. Re: The effect which the absence of a sewage treatment system has on housing in the Deadwood area.
71	1974, Feb. 22	Hoskins-Western-Sonderegger (Lincoln, Nebraska). Letter to Mr. Lawrence F. Jeffries, Manager, Lead-Deadwood Sanitary District No. 1. Re: Alternative wastewater management plans. (Recommends separate treatment facilities)

Ref. No.	DATE	ACTIVITY
72	1974, Feb. 22	Circuit Court of South Dakota (Deadwood, South Dakota). Letter to Mr. Lawrence F. Jeffries, Manager, Lead-Deadwood Sanitary District No. 1. Re: How the lack of an adequate sewer system in Lead affected the housing situation in that city. (FHA mortgage guarantees withheld until adequate sewage facilities installed).
73	1974, Feb.	LDSD Public hearing at Deadwood on BS&L Plan.
74	1974, Feb. 28	Bauer Engineering, Inc. (Chicago, Illinois). Letter to Mr. Lawrence F. Jeffries, Manager, Lead-Deadwood Sanitary District No. 1. Re: Dames and Moore review.
75	1974, Feb.	Kier Laboratories (Denver, Colorado). *Toxicity study for the Lead-Deadwood Sanitary District No. 1*. (Evaluation critical of BS&L plan).
76	1974, Feb.	Brady Consultants, Inc. (Spearfish, South Dakota). *Specifications for interceptor sewer line, sewerage system, for Lead-Deadwood Sanitary District No. 1, Lead-Deadwood, South Dakota*.
77	1974, Mar.	Bauer, Sheaffer and Lear, Inc. (Chicago, Illinois). *Environmental assessment, Lead-Deadwood Sanitary District No. 1*.
78	1974, May 6-8	Field trip by EPA Review Task Force to Lead-Deadwood area.
79	1974, May 17	Sopper W.E. Report "Evaluation of Bauer, Sheaffer and Lear Plan and Field Report" to EPA.
80	1974, May	Thomas R.E., (Kerr Lab., EPA) also Dean R, Wayman C, Smith S, memos on BS&L plan review, -- EPA staff.
81	1974, May 22	State of South Dakota Water Pollution Control Commission passes State Water Quality Standards under P.L. 92500. (Whitewood Creek classified as a cold water fishery.)
82	1974, Jul. 3	U.S. Environmental Protection Agency, Region VIII (Denver, Colorado) Letter to Mr. Lawrence F. Jeffries, Manager, Lead-Deadwood Sanitary District No. 1. Re: Review of the Bauer, Sheaffer and Lear, Inc. (BS&L) plan and environmental assessment for the treatment of Homestake industrial and Lead-Deadwood domestic wastewaters now entering Whitewood Creek.

Ref. No.	DATE	ACTIVITY
83	1974, Jul	Business Research Bureau, School of Business, University of South Dakota (Vermillion, South Dakota). *Regional impact via multiplier analysis of primary: a case study, Homestake Mining Company, Lead, South Dakota*.
84	1974, Jul. 18	EPA approves S.D. water quality standards under PL 92-500.
85	1974, Jul. 28	EPA Region VIII Regional Counsel letter to U.S. Justice Division on status of project.
86	1974, Jul.	South Dakota Department of Environmental Protection (Pierre, South Dakota). *Comprehensive Water quality management for the State of South Dakota*.
87	1974, Jul. 29	Bauer, Sheaffer and Lear, Inc. (Chicago, Illinois). Letter to Mr. Lawrence F. Jeffries, Manager, Lead-Deadwood Sanitary District No. 1. Re: comment on the EPA review of the BS&L wastewater management plan.
88	1974, Jul. 30	Public meeting with EPA, State, LDSD, etc. (EPA explained basis of comments. Conclusion of meeting was to develop facilities plan Step I. Transcript available from EPA).
89	1974, Aug. 14	PL 93-373 enacted to eliminate all regulations on private ownership of gold in U.S.
90	1974, Aug. 14-15	EPA, State, LDSD meeting on facilities plan issues and alternatives.
91	1974, Oct. 11	Review of proposed Homestake-LDSD permit by EPA lab-Duluth.
92	1974, Oct. 15	CH_2M-Hill releases "Preliminary Study Plan."
93	1974, Nov.	EPA Region VIII requests services of NFIC to develop bioassay studies for HMC Lead-Deadwood NPDES permit.
94	1974, Nov. 14	EPA holds public hearing at Deadwood on proposed NPDES permit conditions.
95	1974, Nov. 15	EPA and Save Centennial Valley Associates agree to settle lawsuit out-of-court. (Centennial Prarie and areas below Deadwood eliminated as possible treatment sites).

Ref. No.	DATE	ACTIVITY
96	1974, Nov. 16	South Dakota DEP comments to EPA on proposed permit.
97	1974, Dec. 9	EPA-Homestake held NPDES permit meeting.
98	1974, Dec. 13	EPA Headquarters notifies Region VIII that old Lead-Deadwood grant can be preserved. Waiver on regulations given.
99	1974, Dec. 23	EPA letter to State indicating headquarters waiver to protect LDSD $4.8 million dollar grant.
100	1974, Dec. 22	Homestake requests EPA adjudicatory hearing on permit.
101	1974, Dec. 27	EPA grants hearing to Homestake.
102	1974, Dec. 31	EPA issues Homestake NPDES permit (required by regulations).
103	1974, Dec.	CH2M-Hill, Project Scope & Study Plan for Lead-Deadwood Sanitary District #1.
104	1974, Dec.	CH2M-Hill, Review of Past Studies, Lead-Deadwood Sanitary Sanitary District #1.
105	1974, Dec.	CH2M-Hill, Grizzly Gulch Supportive Data.
106	1975, Jan.	CH2M-Hill, Infiltration & Inflow Analysis for Lead-Deadwood Sanitary District #1.
107	1975, Jan. 17	Lead-Deadwood Sanitary District requests extension from EPA and State on construction deadline.
108	1975, Jan. 23	LDSD requests adjudicatory hearing on NPDES permit.
109	1975, Feb. 3	EPA grants adjudicatory hearing to LDSD.
110	1975, Feb.	Step I application submitted by LDSD to EPA and approved.
111	1975, Feb. 5	EPA/NFIC issues Evaluation of Proposed NPDES Permit Limitations for Homestake Mining Company and Lead-Deadwood Sanitary District #1 (Bioassay study report)
112	1975, Mar. 17-18	Step I Project Review session at Rapid City to evaluate first screening of project alternatives. EPA, State, CH2M-Hill, LDSD, HMC, Save Centennial Valley Assn., etc.
113	1975, Apr. 7	CH2M-Hill releases Basinwide Environmental Overview report.

Ref. No.	DATE	ACTIVITY
114	1975, Apr. 15	CH2M-Hill releases preliminary *Evaluation of Grizzly Gulch Treatment System* report (final version Oct. 1975)
115	1975, Apr. 21	CH2M-Hill releases *Definition of Treatment Requirements and Alternatives* and *Appendices* reports.
116	1975, Apr. 28	Second review meeting of facilities plan alternatives at Rapid City (EPA, State, LDSD, etc.)
117	1975, May 7	CH2M-Hill releases *Development and Evaluation of Industrial Waste Treatment Alternatives* (Homestake) for Lead-Deadwood Sanitary District #1.
118	1975, May 22	EPA Regional Counsel determines that legal settlement precludes use of lagoon alternatives below Whitewood Creek.
119	1975, May 28	LDSD petitions State for change of water quality standards classification of Whitewood Creek.
120	1975, July 18	State holds public hearing to consider amendments to classification of Whitewood Creek.
121	1975, Aug.	EPA-NFIC presents evaluation of NPDES permit conditions for HMC and Lead-Deadwood to EPA Region VIII.
122	1975, Aug. 15	State DEP requests EPA approval to modify Whitewood Creek classification from cold water permanent to cold water marginal on I-90 to lower Deadwood segment.
123	1975, Aug. 19	State DEP advises HMC to proceed independently with treatment facilities in reply to HMC letter.
124	1975, Aug. 20	State DEP approves modification of Whitewood Creek classification to "cold water marginal" on I-90 to lower Deadwood segment.
125	1975, Sept. 8	HMC notifies EPA and State that it will proceed with independent wastewater treatment plans at Grizzly Gulch.
126	1975, Sept. 22	EPA approves change in Whitewood Creek classification.
127	1975, Oct. 1	LDSD notifies EPA that its Board of Trustees favored Grizzly Gulch land treatment, and secondarily a separate system at lower Grizzly Gulch.

Ref. No.	DATE	ACTIVITY
128	1975, Oct. 8	EPA notifies LDSD that EPA will review the new lower Grizzly Gulch proposal.
129	1975, Nov. 6	EPA releases national regulations on best practicable treatment for "Ore Mining and Dressing". (These regulations contain 'no pollutant discharge' for most ore mining operations. EPA Region VIII revises HMC NPDES permit accordingly.)
130	1975, Dec. 11	LDSD releases preliminary Facilities Plan for Lead-Deadwood Sanitary District: Technical Report. (Two final alternatives: lower Grizzly Gulch lagoon system and lower Deadwood conventional system.)
131	1975, Dec. 15	Secretary of State DEP issues order setting effluent limitations and construction timetable.
132	1975, Dec. 22	Meeting of EPA, State, LDSD, et al at Rapid City to discuss draft facilities plan.
133	1976, Jan. 3	EPA notifies LDSD of certain problems with lower Grizzly Gulch lagoon system. (Primarily, comments involve operational reliability of meeting effluent limitations.)
134	1976, Jan. 3-4	LDSD representatives tour new mechanical wastewater treatment plants in Region VIII.
135	1976, Jan. 17	Meeting between HMC and EPA enforcement to discuss Permit conditions.
136	1976, Feb. 6	EPA issues new NPDES permit to HMC.
137	1976, Feb. 10	LDSD public hearing on facilities plan alternatives.
138	1976, Feb. 10	State DEP recommends lower Deadwood alternative to LDSD.
139	1976, Mar. 2	HMC requests new adjudicatory hearing on NPDES permit.
140	1976, Mar. 1-3	State hearing on LDSD effluent requirements.
141	1976, Mar. 5	Order of State DEP hearing officer issued an LDSD effluent limitations and construction timetable.
142	1976, Mar. 9	EPA grants HMC new adjudicatory hearing.
143	1976, Apr. 22	LDSD Board of Trustees recommends lower Deadwood treatment alternative.

Ref. No.	DATE	ACTIVITY
144	1976, May 1	LDSD issues facilities plan documents: Technical Report, Administrative Report and Environmental Assessment.
145	1976, May 6	Meeting of EPA, State and HMC on wastewater treatment progress at Grizzly Gulch.
146	1976, Oct.	Release of Supplement to final EIS on Lead-Deadwood Sanitary District facilities plan.

APPENDIX B

CONDITIONS OF THE 1972
GRANT OFFER

FORM APPROVED

OFFER AND ACCEPTANCE OF FEDERAL GRANT FOR SEWAGE TREATMENT WORKS
UNDER 33 U.S.C. 466 et seq

PART A SECTION I – OFFER

1. LOCATION OF PROJECT (State, County, City) South Dakota, Lawrence, Lead-Deadwood	PROJECT NUMBER C 460200 WPC-SD-200

2. LEGAL NAME AND ADDRESS OF APPLYING AUTHORITY (herein called the "Applicant")

Lead-Deadwood Sanitary District No. 1
P. O. Box 51
Deadwood, South Dakota 57732

3. PROJECT FINANCING UNDER TERMS OF THIS OFFER

Total estimated project cost	$5,600,900.00
Estimated project cost eligible for Federal participation	$5,422,900.00
FEDERAL GRANT OFFERED	$1,789,550.00

4. DESCRIPTION OF PROJECT

New interceptor sewer, lift stations with force mains, tailings-stabilization pond, outfall sewer and appurtenances.

Eligible portion of project is as follows:

1. Interceptor - From storm sewer overflow near Mill Street and East Main Street in Lead, north to Whitewood Creek, following Whitewood Creek to the divide between Whitewood Creek and Polo Creek, thence heading northeast along Polo Creek to tailings-stabilization pond.
2. Interceptor - From intersection of North Main and Glendale Streets in Lead along Highway 14-A to Sherman Street in Deadwood.
3. Lift Stations - West Lead, Pavillion, and near Yates compressor plant.
4. Stabilization Pond.
5. Outfall Line - From stabilization pond east to Whitewood Creek.
6. Combined Sewer Detention Reservoir - Near Mill Street in Lead.

Consideration having been given by the Commissioner of the Federal Water Pollution Control Administration to (a) the application submitted by the Applicant pursuant to Section 8 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 466 et seq.), (b) the public benefits to be derived by the construction of this project, (c) the relation of the ultimate cost of constructing and maintaining the works to the public interest and to the public necessity for the works, and (d) the adequacy of the provisions made or proposed by the Applicant for assuring proper and efficient operation and maintenance of the treatment works after completion of the construction thereof, and it having been determined by the Commissioner that such project (a) is in conformity with the approved State water pollution control plan submitted pursuant to Section 7 of the Act, (b) meets the criteria for Federal aid specified in Section 601.29 of the regulations, and (c) is included in a comprehensive program developed pursuant to [illegible] Act, and the Commissioner having further determined that the State water pollution control agency has approved the project and certified that it is entitled to priority over other eligible projects on the basis of financial as well as water pollution control needs.

The Commissioner of the Federal Water Pollution Control Administration, acting in behalf of the United States of America, hereby offers:

To make a Federal grant to the above named Applicant subject to the assurance included in this document as Section II, in order to aid in financing the construction of the project pursuant to the Federal Water Pollution Control Act, as amended. The amount of the Federal grant will not exceed the appropriate percentage of the estimated reasonable cost of the project, as established by law, or such dollar limitation so established, provided, that in the event the actual reasonable cost of any project, as determined by the Commissioner upon completion of construction, is less than the estimated reasonable cost upon which the grant offer is based, such actual cost shall be used to determine the amount of the Federal grant and the grant shall be reduced as necessary to conform with the limitations hereinabove cited.

[illegible] MADE SUBJECT TO COMPLETION OF PART [illegible] OF THIS Offer and Acceptance AND THE FOLLOWING

The Regulations found at Title 18, Code of Federal Regulations, Chapter V-5 Part 601 et seq., January 1, 1971, Edition, as amended are incorporated herein by reference.

That the project be ready for construction within 300 days of acceptance of the grant offer. Construction is to be completed within 19 months after start of construction. Any extension of time must receive prior approval of the State of South Dakota and the U. S. Environmental Protection Agency.

Federal participation in fees for technical services, legal, fiscal, and administrative costs will be limited to the portion of those costs associated with the eligible part of the total project.

This offer is conditioned to the effect that the applicant will require his consulting engineer to prepare an operation manual describing the functions and controls for each process in the specific plant, plus physical and laboratory controls, maintenance and personnel requirements necessary to operate the facility at maximum effectiveness.

The applicant agrees to abide by the recommendations of the operation manual as approved by the State and the U. S. Environmental Protection Agency.

This offer is further conditioned in that the applicant will require his consulting engineer to provide on-the-job training to instruct plant employees in the operation of equipment, coordination of the laboratory with plant controls, and other functions for which the plant personnel will be responsible. This training will include the initial "start-up" phase.

Approval of this project for Federal financial assistance does not constitute Federal sanction or approval of any changes or deviations from established water quality standards, criteria or implementation dates--or from dates established by applicable Enforcement proceedings.

(Cont'd on Insert Sheets)

HIS OFFER MUST BE ACCEPTED, IF AT ALL, ON OR BEFORE (date)

FOR THE UNITED STATES OF AMERICA, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

OF THE COMMISSIONER John A. Green	DATE 4/24/72

ITLE OF OFFICER
Regional Administrator, EPA, Region VIII

SECTION II - ASSURANCES

The Applicant hereby gives assurance to the Commissioner of the Federal Water Pollution Control Administration:

A. That actual construction work will be performed by the lump sum (fixed price) or unit price contract method, that adequate methods of obtaining competitive bidding will be employed prior to awarding the construction contract, and that the award of the contract will be made to the responsible bidder submitting the lowest acceptable bid,

B. That the project will not be advertised or placed on the market for bidding until the final plans and specifications have been approved by the Commissioner and the appropriate State agency, and the Applicant has been so notified,

C. That the construction contract will require the contractor to furnish performance and payment bonds, the amount of which shall each be in an amount not less than fifty percentum (50%) of the contract price, and to maintain during the life of the contract adequate fire, and extended coverage, workmen's compensation, public liability and property damage insurance;

D. That any change or changes in the contract which make any major alteration in the work required by the plans and specifications, or which raise the cost of the project above the latest estimate approved by the Commissioner will be submitted to the Commissioner for prior approval;

E. That the construction of the project, including the letting of contracts in connection therewith, shall conform to the applicable requirements of State, territorial and local laws and ordinances;

F. That the construction contract will provide that the representatives of the Federal Water Pollution Control Administration and the State will have access to the work whenever it is in preparation or progress and that the contractor will provide proper facilities for such access and inspection.

G. That the Applicant will provide and maintain competent and adequate engineering supervision and inspection at the project to insure that the construction conforms with the approved plans and specifications.

H. That adequate accounting and fiscal records will be maintained which fully disclose the amount, receipt, and disposition of the grant assistance provided, the total cost of the project in connection with which the grant has been obtained, the amount and identification of that portion of the cost of the project supplied from other sources, and such other records as the Commissioner may prescribe to facilitate an effective audit.

I. That all funds granted pursuant to the Federal Water Pollution Control Act shall be expended solely for carrying out the approved project.

J. That the Commissioner and the Comptroller General of the United States, or any of their duly authorized representatives, shall have access for the purpose of audit and examination to any books, documents, papers, and records of the grantee that are pertinent to grants received under the Act, and the grantee shall submit to the Commissioner or the Comptroller General of the United States such documents and information as they may require in connection with the project.

K. That the construction contract will require the contractor to comply with the regulations of the Secretary of Labor made pursuant to the Davis–Bacon Act of March 3, 1931, as amended (40 U.S.C. 276a through 276a–5), the Anti-Kickback Act of June 13, 1934 (40 U.S.C. 276c), and the Contract Work Hours Standards Act of August 13, 1962 (40 U.S.C. 327–330), and any amendments or modifications thereto, to cause appropriate provisions to be inserted in subcontracts to insure compliance therewith by all subcontractors subject thereto, and to be responsible for the submission of statements required of subcontractors thereunder, except as the Secretary of Labor may specifically provide for reasonable limitation, variations, tolerances, and exemptions from the requirements thereof.

L. That the Applicant will demonstrate to the satisfaction of the Commissioner his ability to pay the remaining cost of the project.

M. That the Applicant will demonstrate to the satisfaction of the Commissioner that he has or will have a fee simple or such other estate or interest in the site of the project, including necessary easements and rights–of–way, as the Commissioner finds sufficient to assure undisturbed use and possession for the purposes of construction and operation for the estimated life of the project.

N. That the declarations, assurances, representations and statements made by the Applicant in the application, and all documents, amendments and communications filed with the Federal Water Pollution Control Administration by the Applicant in support of its request for a grant, will be fulfilled.

O. That the applicant will permit the Administration or its authorized agents to have access to the project and the records pertaining to its operation at any reasonable time following completion of construction for the purpose of inspecting the operation and maintenance of the project.

P. The Applicant agrees to construct the project or cause it to be constructed to final completion in accordance with the application and plans and specifications approved by the Commissioner.

Q. That the applicant agrees to provide a sign for identification of this project in accordance with specifications to be furnished by the U. S. Environmental Protection Agency.

R. That the facility will be maintained and operated in accordance with such requirements as the Administrator may publish from time to time concerning methods, techniques, and practices for economic, efficient, and effective operation and maintenance of treatment works.

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CONSTRUCTION GRANTS
REGION VIII

SECTION III - ACCEPTANCE

FOR/ON BEHALF OF (Legal Name of Applicant)

Lead-Deadwood Sanitary District No. 1

I, the undersigned, being duly authorized to take such action, as evidenced by the attached CERTIFIED COPY OF AUTHORIZATION BY THE APPLICANT'S GOVERNING BODY, do hereby accept this offer and make the assurances contained herein.

SIGNATURE OF AUTHORIZED REPRESENTATIVE: Lawrence Jeffries

DATE: May 2, 1972

NAME AND TITLE OF REPRESENTATIVE (Type or Print)

Lawrence Jeffries, President, Board of Trustees, Lead-Deadwood Sanitary District No. 1

DDITIONAL GRANT OFFER CONDITIONS (Part A Insert)

hat the plans and specifications covering the proposed work are submitted to the outh Dakota Department of Highways for review with respect to possible conflicts n improving the existing highway along the Whitewood Creek Valley; and that the eview comments be included with the plans and specifications when submitted to he South Dakota State Department of Health and the Environmental Protection gency.

hat the plans and specifications covering the proposed work are submitted to the . S. Army Corps of Engineers, Omaha District, for review with respect to the ossible increase of flood hazards along Whitewood Creek, and that the review omments be included with the plans and specifications when submitted to the South akota State Department of Health and the Environmental Protection Agency.

hat prior to completion of the plans and specifications for the project, the istrict will undertake a study to determine whether archaeological resources are resent in the project area, that a letter summarizing the findings of the study e submitted to the South Dakota State Department of Health and the Environmental rotection Agency, Region VIII. Provided further that the letter report summa-izing the study be submitted prior to submission of final plans and specifica-ions.

hat the District will develop an adequate ground water quality monitoring program n the vicinity of the tailings - stabilization pond site to check all fresh water quifers for possible pollution. A proposal outlining the ground water quality onitoring program shall be submitted with the final plans and specifications for eview and approval.

hat the District will develop an adequate effluent monitoring program. A proposal utlining the effluent monitoring program shall be submitted with the final plans nd specifications for review and approval, in accordance with parameters and outines as established by the South Dakota Department of Health and as concurred n by the Environmental Protection Agency.

hat the District will adopt an industrial waste ordinance giving it the legal uthority to require pretreatment or additional treatment of industrial wastes to uch level of strength and toxicity as the District may conclude necessary for atisfactory operation of the waste treatment works or that the industrial wastes e excluded from the sewerage system. Further, that the District will give written ssurance that such pretreatment, exclusion, or additional treatment will be equired in the event that any of the following conditions develop:

a. The presence of any cyanides, heavy metals or other any pollutants in the ground water aquifiers in the vicinity of the tailings stabilization pond which, in the judgment of the South Dakota State Department of Health or the Environmental Protection Agency, constitute pollution potentially hazardous to its use and which are present in the waste waters discharged to the tailings - stabilization pond.

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b. The presence of any cyanide, heavy metal or other pollutants in the effluent from the waste stabilization pond due to industrial wastes which causes violation of effluent standards or of water quality standards in the receiving waters. It is understood that effluent standards have been established by the South Dakota Committee on Water Pollution as described on pages 20 and 21 of the Preliminary Engineering Report.

c. The occurrence of any condition which causes a significant hazard to wildlife due to the presence of cyanides or heavy metals in the waste stabilization pond.

That the District adopt an industrial waste ordinance which specifically prohibits the discharge of any mercury into the sewerage system from manufacturing or other industrial processing operations. That the District give its assurance that it has or will have an equitable system of cost recovery for industrial wastes in accordance with the provisions of 18 CFR 601.34. Further, that the district require a financial commitment from Homestake Mining Company to insure adequate funds for amoritization of capital costs and operation and maintanance of the project over its 20 year design life in the event Homestake Mining Company should cease operations in the Lead-Deadwood area.

Industrial wastes shall not be discharged significantly above the processing rates as set forth in the preliminary engineering report, unless a specific agreement between the Sanitary District and the discharging industry is made. This shall include a cost recovery schedule from the industry to compensate the district in proportion to the decrease in the life of the project by absorption of remaining payments.

That the District will develop a program for regular inspection and evaluation of the interceptor sewer with respect to possible deterioration due to erosion and corrosion. The program will provide for necessary preventative measures or repairs in the event that deterioration of sewer pipe or manholes is a significant problem. Further, the program will include a contingency plan to minimize pollution of Whitewood Creek in the event of pipeline failure. A proposal outlining the proposed program should be submitted for review and approval with the final plans and specifications.

That the stabilization pond be adequately sealed to minimize seepage, and prevent ground water pollution.

That the District give its assurance to development of a program for rehabilitation of the tailings - stabilization pond site at the end of its service life. Further, that it deposit a surety or cash bond in an amount sufficient to accomplish reclamation work or oblige itself under the construction grant as a contract undertaking to finance and complete reclamation work irrespective of whether Homestake Mining Company is still operating at the end of the project life.

Page 3 - ADDITIONAL GRANT OFFER CONDITIONS (Part A Insert)

That the District will give its assurance to the development of a long range program for reduction of existing infiltration in the sewer system, reduction or elimination of combined storm-sanitary sewers, and elimination of clean water connections to the sanitary sewer system. Further, that the program will include the enactment of an enforceable sewer use ordinance to eventually eliminate existing, and prohibit future clear water connections to the sanitary sewer system and to establish adequate controls over all service connections.

The entire facility shall be constructed and operated with maximum regard for environmental values. Specifically, but not by way of limitation, all possible effort consistent with the construction and operation technology, as it exists from time to time, shall be exercised to prevent air pollution, water pollution, and destruction of or harm to wild animals and birds, and domestic livestock.

The facility shall also be constructed and operated with all such possible economy in land use, and prevention of land damage, as shall be from time to time consistent with the state of technology.

In the construction and operation of the facility, landscaping, reclamation and design engineering shall be employed to the end that the best possible visual result for the facility be obtained.

APPENDIX C

NPDES PERMIT LIMITATIONS FOR HOMESTAKE MINING COMPANY & LEAD-DEADWOOD SANITARY DISTRICT

1. Homestake Permit: C-1 to C-12
2. Lead-Deadwood Permit: C-13 to C-36

MI

Permit No. SD-0000043

Application No. 2SB-0XT-2-000081

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et. seq; the "Act"),

Homestake Mining Company
P.O. Box 875
Lead, South Dakota 57754

is authorized to discharge from a facility located at Lead, South Dakota,

to receiving waters named Gold Run and to other tributaries of Whitewood Creek, subject to the approval of the permit issuing authority,

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective on the date of issuance.*

This permit and the authorization to discharge shall expire at midnight, June 30, 1981.

Signed this 3rd day of SEPTEMBER, 1976

JOHN A. GREEN
REGIONAL ADMINISTRATOR

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* Thirty (30) days after the date of receipt of this permit by the Applicant.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. All streams prior to July 1, 1977:

Effective immediately and lasting through June 30, 1977, the permittee is authorized to discharge mine waters, mill process waters, and non-contact waters to Gold Run Creek. No monitoring will be required during this period.

2. Non-Contact Waters - After July 1, 1977 (Outfall 002):

During the period beginning July 1, 1977, the permittee is authorized to discharge all non-contact wastewaters to Gold Run Creek, provided that nothing is added to these wastewaters except heat and provided that the source of these waters is not mill contact water, process water, or any other contaminated water. The Temperature of this discharge shall not exceed 65° F. and shall be measured once a week. pH and Total Suspended Solids tests shall be conducted on this outfall once a month.

3. B and M Tunnel Drainage - After July 1, 1977 (Outfall 002A):

During the period beginning July 1, 1977, the permittee shall monitor Outfall 002A monthly for the effluent characteristics specified below: (Composite Sample)

Total Suspended Solids
Total Cadmium
Total Copper
Total Zinc
Total Chromium
Total Lead
Total Mercury
Total Nickel
Total Silver
Total Arsenic

Outfall 002A consists of the B and M Tunnel Drainage prior to mixture with the non-contact waters. It is located at the corner of Enos and Main Streets in Lead, South Dakota.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - New Waste Treatment Plant Discharge (Outfall 001)

4. During the period beginning July 1, 1977, the permittee is authorized to discharge from the new waste treatment facility.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Concentration		(Effective July 1, 1977)	
	mg/l Daily Avg	mg/l Daily Max	Measurement Frequency	Sample Type
Total Suspended Solids	N/A	10.0 1/	Weekly	Composite
Total Cadmium	N/A	0.00025	Monthly	Composite 2/
Total Copper	N/A	0.009	Weekly	Composite 3/
Total Zinc	N/A	0.020	Weekly	Composite
Total Chromium	N/A	0.85	Monthly	Composite
Total Lead	0.20	0.28	Weekly	Composite
Total Mercury	N/A	0.001	Monthly	Composite
Total Nickel	N/A	1.25	Monthly	Composite
Total Silver	N/A	0.001	Weekly	Composite 4/
Total Arsenic	N/A	0.38	Monthly	Composite
Cyanide	N/A	0.02	Monthly	Composite 5/

Flow shall not exceed 825 gpm and shall be monitored continuously. Also see Part III, B.(3).

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored weekly by instantaneous type of measurement.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At the discharge from the new treatment facility prior to mixture with the non-contact wastewaters.

1/ In addition to the above requirements, any grab sample shall not exceed 18 mg/l for this parameter.
2/ Values less than 0.01 mg/l may be reported as "less than 0.01 mg/l."
3/ Values less than 0.05 mg/l may be reported as "less than 0.05 mg/l."
4/ Values less than 0.02 mg/l may be reported as "less than 0.02 mg/l."
5/ Frequency to become weekly upon approval of an automated analysis for this parameter.

B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

Completion of tailings pond pumping station ---------- March 1, 1977.

Attainment of Final Operational Status --------------- July 1, 1977.

2. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

Compliance and interim reporting dates shall be for periods not to exceed nine (9) months and to the extent practical shall fall on the last day of March, June, September, and December.

C. MONITORING AND REPORTING - Not applicable until July 1, 1977

1. *Representative Sampling*

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. *Reporting*

Monitoring results obtained during the previous month shall be summarized for each month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on August 28, 1977. Duplicate signed copies of these, and all other reports required herein, shall be submitted to the Regional Administrator and the State at the following addresses:

U.S. Environmental Protection Agency
Suite 900, 1860 Lincoln Street
Denver, Colorado 80203
Attention: Enforcement - Permits

South Dakota Department of
Environmental Protection
State Capitol
Pierre, South Dakota 57501

3. Definitions

a. The "daily average" concentration means the average concentration during a calendar month. Where less than daily sampling is required by this permit, the average concentration shall be determined by the summation of all measured daily samples divided by the number of days during the calendar month when the measurements were made.

b. The "daily maximum" concentration shall be determined by the analysis of a properly preserved composite sample composed of a minimum of four (4) grab samples collected at equally spaced two (2) hour intervals and proportioned according to flow at the time of sampling.

4. *Test Procedures*

Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304(g) of the Act, under which such procedures may be required.

5. *Recording of Results*

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The dates the analyses were performed;

c. The person(s) who performed the analyses;

d. The analytical techniques or methods used; and

e. The results of all required analyses.

6. *Additional Monitoring by Permittee*

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form (EPA No. 3320-1). Such increased frequency shall also be indicated.

7. *Records Retention*

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the State water pollution control agency.

A. MANAGEMENT REQUIREMENTS

1. *Change in Discharge*

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new NPDES application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permit issuing authority of such changes. Following such notice, the permit may be modified to specify and limit any pollutants not previously limited.

2. *Noncompliance Notification*

If, for any reason, the permittee does not comply with or will be unable to comply with any daily maximum effluent limitation specified in this permit, the permittee shall provide the Regional Administrator and the State with the following information, in writing, within five (5) days of becoming aware of such condition:

a. A description of the discharge and cause of noncompliance; and

b. The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

3. *Facilities Operation*

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

4. *Adverse Impact*

The permittee shall take all reasonable steps to minimize any adverse impact to navigable waters resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. *Bypassing* (See additional requirements under PART III)

Any diversion from or bypass of facilities necessary to maintain compliance with the terms and conditions of this permit is prohibited, except (i) where unavoidable to prevent loss of life or severe property damage, or (ii) where excessive storm drainage or runoff would damage any facilities necessary for compliance with the effluent limitations and prohibitions of this permit. The permittee shall promptly notify the Regional Administrator and the State in writing of each such diversion or bypass.

6. *Removed Substances*

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

7. *Power Failures*

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. In accordance with the Schedule of Compliance contained in Part I, provide an alternative power source sufficient to operate the wastewater control facilities;

or, if such alternative power source is not in existence, and no date for its implementation appears in Part I,

b. Halt, reduce or otherwise control production and/or all discharges upon the reduction, loss, or failure of the primary source of power to the wastewater control facilities.

B. RESPONSIBILITIES

1. *Right of Entry*

The permittee shall allow the head of the State water pollution control agency, the Regional Administrator, and/or their authorized representatives, upon the presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any discharge of pollutants.

2. *Transfer of Ownership or Control*

In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Regional Administrator and the State water pollution control agency.

3. *Availability of Reports*

Except for data determined to be confidential under Section 308 of the Act, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Regional Administrator. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act.

4. *Permit Modification*

After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

5. *Toxic Pollutants*

Notwithstanding Part II, B-4 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified.

6. *Civil and Criminal Liability*

Except as provided in permit conditions on "Bypassing" (Part II, A-5) and "Power Failures" (Part II, A-7), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. *Oil and Hazardous Substance Liability*

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

8. *State Laws*

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

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9. *Property Rights*

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

10. *Severability*

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

PART III

OTHER REQUIREMENTS

A. Additional Bypassing Requirements

If, for other reasons, a partial or complete bypass is considered necessary, a request for such bypass shall be submitted to the State of South Dakota and to the Environmental Protection Agency at least sixty (60) days prior to the proposed bypass. If the proposed bypass is judged acceptable by the State of South Dakota and by the Environmental Protection Agency, the bypass will be allowed subject to limitations imposed by the State of South Dakota and the Environmental Protection Agency.

If, after review and consideration, the proposed bypass is determined to be unacceptable by the State of South Dakota and the Environmental Protection Agency, or if limitations imposed on an approved bypass are violated, such bypass shall be considered a violation of this permit; and the fact that application was made, or that a partial bypass was approved, shall not be a defense to any action brought thereunder.

B. Grizzly Gulch Runoff

(1) All runoff from undisturbed areas above the permittee's Grizzly Gulch tailings pond, and due to storms with an intensity less than a 10-year return interval, shall be diverted around the tailings pond and released to the natural drainage in such a manner so as to minimize erosion and channel scouring. A 10-year storm or precipitation event is defined as 3.6 inches of rainfall in a 24-hour period or its equivalent in a shorter time interval as defined by the National Oceanic and Atmospheric Administration in the "Rainfall Frequency Atlas of the United States," Weather Bureau Technical Paper No. 40.

OTHER REQUIREMENTS (CONTINUED)

B. Grizzly Gulch Runoff (Continued)

(2) Areas in Grizzly Gulch which have been cleared and which are at elevations above the diversion ditches shall be mulched and/or reseeded in a manner which will reduce runoff and erosion to a level comparable with undisturbed areas in Grizzly Gulch.

(3) Precipitation events in excess of the 10-year storm may be allowed to spill into the Grizzly Gulch tailings pond. Following the occurrence of such a precipitation event and the proper documentation of such an event, the permittee, following written application to the permit issuing authority, may be granted a temporary increase in the volume of discharge from the waste treatment plant commensurate with the amount of inflow to the Grizzly Gulch tailings pond due to the storm event with an intensity greater than the 10-year storm. However, concentration limitations presented in Part I, A.3., shall be met at all times during periods of temporary flow increases. Suitable documentation of such an event shall include but not be limited to:

(a) Rainfall records from either the United States weather station at Lead, South Dakota, or a permittee-operated recording precipitation gauge(s) at the mill or Grizzly Gulch location; and,

(b) Measurements of the amount of tailings-water mixture pumped into the Grizzly Gulch tailings pond; and,

(c) Elevation measurements of the water level in the Grizzly Gulch tailings pond documenting that volume of inflow due to the greater than 10-year storm.

(d) Any other analytical data or empirical calculations based on recognized hydrological methods which the permittee determines to be applicable to further document that volume of inflow due to the greater than 10-year storm.

(4) When precipitation events occur such that an excess of 3.6 inches of rainfall occurs during any 15-day period, the permittee, following written application to the permit issuing authority, may be granted a temporary increase in the volume of discharge from the waste treatment plant commensurate with that amount of precipitation falling within the Grizzly Gulch

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OTHER REQUIREMENTS (CONTINUED)

B. Grizzly Gulch Runoff (Continued)

(4) Continued

tailings pond below the interceptor canal during this period. However, concentration limitations presented in Part I, A.3., shall be met at all times during the period of temporary flow increases. Suitable documentation shall include but not be limited to:

(a) Rainfall records from either the United States weather station at Lead, South Dakota, or a permittee-operated recording precipitation gauge(s) at the mill or Grizzly Gulch location; and,

(b) Elevation measurements of the water level in the Grizzly Gulch tailings pond documenting that volume of precipitation added to the pond during this period.

(c) Any other analytical data or empirical calculations based on recognized hydrological methods which the permittee determines to be applicable to further document that volume of precipitation added to the pond during this period.

Permit [illegible]: SD-0020796

Effective Date - Date of Issuance*
Expiration Date: December 31, 1977

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et. seq.) (hereinafter referred to as "the Act"),

the Lead-Deadwood Sanitary District Number 1,

is authorized by the United States Environmental Protection Agency

to discharge from the collection systems located in the Cities of Lead and Deadwood, South Dakota, and surrounding areas located within the jurisdiction of the Sanitary District,

to Whitewood Creek and tributaries thereof,

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III, hereof

Authorized Permitting Official

DEC 31 1974
Date

for
John A. Green, Regional Administrator
Title

*Thirty (30) days after the date of receipt of this permit by the Applicant.

N.B: This Permit is being rewritten to reflect more recent changes in water quality standards.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. Effluent Limitations

Effective immediately, the quality of effluent discharged by the facility shall, as a minimum, meet the limitations as set forth below:

There shall be no change in operation that will significantly deteriorate the quality of the discharge below that presented in the permit application.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Continued)

2. Future Effluent Limitations

Effective as soon as reasonable and practical but no later than July 1, 1977, the quality of effluent discharged by the facility shall, as a minimum, meet the limitations as set forth below:

	Effluent Concentration	
Parameter	Daily	Instantaneous
BOD_5 - mg/l f/	10 e/	17.5 d/
Total Suspended Solids - mg/l f/	10 e/	17.5 d/
Fecal Coliform - number/100 ml	200 (30-day average) c/ 400 (7-day average) c/	N/A N/A
Total Residual Chlorine - mg/l	N/A	0.05 d/
Ammonia (as N) - mg/l	N/A	1.0 d/
pH - units	Shall remain between 6.0 and 9.0. d/	

a/ This limitation shall be determined by the arithmetic mean of a minimum of three (3) conseuctive samples taken on separate weeks in a 30-day period (minimum total of three (3) samples); not applicable to fecal coliforms - see footnote c/.

b/ This limitation shall be determined by the arithmetic mean of a minimum of three (3) consecutive samples taken on separate days in a 7-day period (minimum total of three (3) samples); not applicable to fecal coliforms - see footnote c/.

c/ Averages for fecal coliforms shall be determined by the geometric mean of a minimum of three (3) consecutive grab samples taken during separate weeks in a 30-day period for the 30-day average, and during separate days in a 7-day period for the 7-day average. (minimum total of three (3) samples)

d/ Any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Continued)

2. Future Effluent Limitations (Continued)

e/ This limitation shall be met at all times based on the results of representative composite samples collected over a 24-hour sampling period.

f/ In addition to the above limitations, the arithmetic mean of the values for biochemical oxygen demand and suspended solids for effluent samples collected in a 30-day period shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period. (85 percent removal) The arithmetic mean shall be based on a minimum of three (3) consecutive samples taken on separate weeks in a 30-day period.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Continued)

3. Self-Monitoring Requirements

As a minimum, the following parameters shall be monitored at the frequency and with the type of measurement indicated; samples of measurements shall be representative of the volume and nature of the monitored discharge. The permittee shall monitor his discharge(s) as shown below. If no discharge occurs during the monitoring period, "no discharge" shall be reported.

Parameter	Frequency a/	Type of Measurement b/
Total Flow, mgd d/ e/	Continuous	Recording
Total BOD$_5$ - mg/l d/	Twice weekly	Composite
Total Suspended Solids, mg/l c/	Twice weekly	Composite
Fecal Coliforms, number/100 ml	Twice weekly	Grab
pH - units	Daily	Grab
Ammonia (as N) - mg/l	Twice weekly	Composite
Total Residual Chlorine - mg/l (required only if the effluent is chlorinated)	Daily	Grab
Temperature - °F.	Twice weekly	Grab

a/ If a continual discharge occurs, samples shall be collected at the listed frequency. If the discharge occurs on an intermittent basis, sampling shall consist of one (1) grab sample to be taken and analyzed prior to any discharge. This analysis shall be reported to the State of South Dakota at the address given in Part I, C-2 of this permit. No discharge shall occur from the facility until an analysis is evaluated and permission is granted to discharge by the State of South Dakota. In addition, two (2) grab samples per week shall be taken, analyzed, and reported immediately to the State of South Dakota for the duration of the discharge.

b/ See definitions, Part I, Section C-3.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Continued)

3. Self-Monitoring Requirements (Continued)

c/ In addition to monitoring the final discharge, influent samples shall be taken and analyzed for this parameter at the same frequency as required for this parameter in the discharge.

d/ A flow-measuring device shall be installed within the wastewater plant circuit at the proposed new facility to give a representative value of effluent volume unless the permittee can affirmatively demonstrate that there has been and will be no discharge from the facility.

e/ If the rate of discharge is controlled, the rate and duration of discharge shall be reported.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Continued)

4. Joint Treatment of Municipal and Homestake Mining Company Wastewaters

In the event that industrial waste from the Homestake Mining Company is introduced into the subject treatment facility, the following effluent limitations and monitoring requirements shall apply, in addition to those contained in Part I, Sections A-1 and A-2, of this permit.

During the period beginning ninety (90) days following the introduction of industrial wastes from the Homestake Mining Company into the subject facility, but no later than July 1, 1977, and lasting through December 31, 1977, the permittee is authorized to discharge according to the following limitations. The location(s) of outfall(s) are to be determined at a later date, subject to the approval of the permit issuing authority.

Effluent Characteristic	Discharge Limitations 1/ kg/day (lbs/day) Daily Avg	kg/day (lbs/day) Daily Max	Concentration mg/l Daily Avg	Concentration mg/l Daily Max	Monitoring Requirements 1/ Measurement Frequency	Sample Type
Flow - M^3/Day (MGD)	N/A	N/A	N/A	N/A	Continuous	Recording
Total Iron	N/A	N/A	N/A	0.3 2/	Monthly	Composite
Free Cyanide	N/A	N/A	N/A	0.008 3/	Weekly	Composite
Total Cyanide	N/A	N/A	N/A	0.03 3/	Weekly	Composite
Total Arsenic	N/A	N/A	N/A	0.16 4/	Monthly	Composite
Total Cadmium	N/A	N/A	N/A	0.005 4/	Monthly	Composite
Total Chromium	N/A	N/A	N/A	0.08 4/	Monthly	Composite
Total Copper	N/A	N/A	N/A	0.03 4/	Weekly	Composite

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Continued)

4. Joint Treatment of Municipal and Homestake Mining Company Wastewaters (Continued)

Effluent Characteristic	Discharge Limitations 1/				Monitoring Requirements 1/	
	kg/day (lbs/day)		Concentration			
	Daily Avg	Daily Max	mg/l Daily Avg	mg/l Daily Max	Measurement Frequency	Sample Type
Total Lead	N/A	N/A	N/A	0.08 4/	Monthly	Composite
Dissolved Lead	N/A	N/A	N/A	0.022 4/	Monthly	Composite
Total Mercury	N/A	N/A	N/A	0.0003 4/	Monthly	Composite
Total Nickel	N/A	N/A	N/A	0.31 4/	Monthly	Composite
Total Silver	N/A	N/A	N/A	0.0003 4/	Weekly	Composite
Total Zinc	N/A	N/A	N/A	0.06 4/	Weekly	Composite
Oil and Grease	N/A	N/A	N/A	10.0 3/	Weekly	Grab
Undisassociated Hydrogen Sulfide	N/A	N/A	N/A	0.003 3/	Weekly	Composite

The pH shall not be less than 6.5 standard units nor greater than 9.0 standard units and shall be monitored daily with an instantaneous type of measurement.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the point of discharge from the proposed treatment facility. The sampling point location shall be subject to the approval of the permit issuing authority.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Continued)

4. Joint Treatment of Municipal and Homestake Mining Company Wastewaters (Continued)

1/ See definitions in Section C-3, following.

2/ In addition to the above daily maximum concentration limitation, the analysis of any single properly preserved grab sample, shall not exceed 175 percent of the daily maximum concentration (1.75 times the limitation) .

3/ Any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

4/ In addition to the above daily maximum concentration limitation, the analysis of any single properly preserved grab sample, shall not exceed 125 percent of the daily maximum concentration (1.25 times the limitation).

B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for all discharges in accordance with the following schedule of compliance:

   (a) Completion of Infiltration and Inflow Analysis - January 15, 1975

   (b) Completion of Phase I of Facilities Plan - February 1, 1975

   (c) Completion and submittal of a report no later than February 15, 1975. Such report shall contain:

      (1) Identification of potential accelerated construction portions of the wastewater management system

      (2) Selection of a minimum of one (1) accelerated construction portion of the wastewater management system for initiation on or before September 1, 1975

      (3) An implementation plan to accomplish the initiation of construction of the selected portion(s) of the wastewater management system on or before September 1, 1975

      Any such construction portion(s) identified and selected shall be common to all alternatives to the overall wastewater management system under investigation in the Step I development of the final facilities plan.

      Upon approval of the implementation plan for the selected accelerated construction by the permit issuing authority, the plan shall become a condition and part to this permit.

   (d) Completion of Phase II (final) Facilities Plan - April 15, 1975

   (e) Completion and submittal of a report no later than June 1, 1975. Such report shall contain:

      (1) Definition and selection of the proposed overall wastewater management system

B. SCHEDULE OF COMPLIANCE (Continued)

(2) Identification of major wastewater contributors to be included in the wastewater management system

(3) Identification of the proposed location of major units of the wastewater management system

(4) Identification of the proposed treatment technology to be utilized for each major unit of the wastewater management system

(f) Submit to the permit issuing authority, no later than June 1, 1975, a supplemental compliance schedule setting forth dates to accomplish the following tasks:

(1) Award of contract(s)

(2) Completion of final plans and specifications

(3) Commencement of construction of major construction phases

(4) Completion of construction of major construction phases

(5) Completion of all construction

(6) Attainment of operational status of major units and total wastewater management system

(7) Attainment of compliance with all final effluent limitations no later than July 1, 1977.

Upon approval of the above supplemental compliance schedule by the permit issuing authority, it shall become a part and condition to this permit.

(g) Completion and submittal of an Environmental Assessment on the proposed wastewater management system no later than August 1, 1975.

C. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. The sampling point location shall be subject to the approval of the permit issuing authority.

2. Reporting

Monitoring results obtained during the previous month shall be summarized for the month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed reporting period. The first report is due following the first month of operation of the proposed new facility. Duplicate signed copies of these, and all other reports required herein, shall be submitted to the Regional Administrator and the State at the following addresses: If no discharge occurs during the reporting period, "no discharge" shall be reported.

U.S. Environmental Protection Agency
Suite 900, 1860 Lincoln Street
Denver, Colorado 80203
Attention: Enforcement - Permits

South Dakota Department of
Environmental Protection
State Office Building No. 2
Pierre, South Dakota 57501

3. Definitions

(a) The "daily average" discharge means the total discharge by weight during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by this permit, the daily average discharge shall be determined by the summation of all the measured daily discharges by weight divided by the number of days during the calendar month when the measurements were made.

(b) The "daily maximum" discharge means the total discharge by weight during any calendar day. This limitation shall be determined by the analyses of a properly preserved composite sample composed of a minimum of twelve (12) grab samples collected at equally spaced two (2) hour intervals and proportioned according to flow at the time of sampling.

(c) The "daily average" concentration means the average concentration during a calendar month. Where less than daily sampling

C.3.(c) (Continued)

is required by this permit, the average concentration shall be determined by the summation of all measured daily samples divided by the number of days during the calendar month when the measurements were made.

(d) The "daily maximum" concentration shall be determined by the analysis of a properly preserved composite sample composed of a minimum of twelve (12) grab samples collected at equally spaced two (2) hour intervals and proportioned according to flow at the time of sampling.

(e) "Net" value, noted under Effluent Characteristics are calculated on the basis of the net increase of the individual parameter over the quantity of that same parameter present in the intake water measured prior to any contamination or use in the process of this facility. Any contaminants contained in any intake water obtained from underground wells shall not be adjusted for as described above and therefore shall be considered as process input to the final effluent. Limitations in which "net" is not noted are calculated on the basis of gross measurements, of each parameter in the discharge irrespective of the quantity or quality of those parameters in the intake waters.

(f) A "composite" sample, for monitoring requirements, unless otherwise indicated, is defined as a minimum of twelve (12) grab samples collected at equally spaced two (2) hour intervals and proportioned according to flow.

(g) A "grab" sample, for monitoring requirements, is defined as a single "dip and take" sample collected at a representative point in the discharge stream.

(h) The reported value for any "instantaneous" type of measurement shall consist of the average, maximum, and minimum, as developed from at least four (4) measurements taken at approximately two (2) hour intervals.

4. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304(g) of the Act, under which such procedures may be required.

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

(a) The exact place, date, and time of sampling;
(b) The dates the analyses were performed;
(c) The person(s) who performed the analyses
(d) The analytical techniques or methods used, and
(e) The results of all required analyses.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report form (EPA No. 3320-1). Such increased frequency shall also be indicated.

7. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the State water pollution control agency.

8. Industrial Wastes

Industrial waste discharges into the sewer collection system must be pretreated to prevent the discharge of pollutants or toxic materials which would interfere with, pass through, or otherwise be incompatible with the treatment works. The degree of pretreatment shall be to a level so that the discharge of such pollutants attributable to industrial sources shall meet all toxic and pretreatment standards required under Section 307 of the Federal Water Pollution Control Act Amendments of 1972.

On or before June 1, 1975, the permittee shall submit suitable documentation to the State of South Dakota and the Regional Administrator, documenting its capability and/or plans to enforce all pre-treatment requirements necessary to ensure compliance with the terms and conditions of this permit, as well as to ensure compliance by all major contributing industries with the pre-treatment standards and any other applicable requirements promulgated pursuant to Section 307 of the Act. Suitable documentation shall mean executed contracts with all major contributing industries, such contracts containing specific pre-treatment requirements and monitoring of industrial inflows for a minimum of those parameters identified in the specific pre-treatment requirements.

Beginning July 1, 1975, and at quarterly intervals thereafter, the permittee shall submit to the permit issuing authority a report summarizing the progress of all known major contributing industries subject to the requirements. These reports shall include at least the following information:

(a) A narrative summary of actions taken by the permittee to ensure that all major contributing industries comply with the requirements of Section 307.

(b) The number of major contributing industries using the treatment works, divided into SIC group categories.

(c) The number of major industries, divided into SIC group categories, in full compliance with the requirements of Section 307, or not subject to these requirements (e.g., discharge only compatible pollutants).

(d) A list identifying by name, those major contributing industries presently in violation of the requirements of Section 307.

The quarterly reports must be submitted to the permit issuing authority by the first day of the months of January, April, July, and October of each year, until compliance is achieved. Submission would be required again only if a major contributing industry reverts to violating the requirements of Section 307.

Immediately upon issuance of this permit, the permittee shall establish and implement a procedure to obtain specific information on the quality and quantity of effluents introduced by all major contributing industries, or projected to be introduced upon connection. The following information shall be obtained as a minimum:

(a) average and peak flows.

(b) qualities and quantities of effluent parameters which would or might reasonably be expected to interfere with, pass through, or otherwise be incompatible with the treatment works.

(c) qualities and quantities of toxic materials identified pursuant to Section 307(a) of the Act.

This information shall be submitted to the permit issuing authority on a semiannual basis beginning July 1, 1975. Once the specific nature of the industrial contribution has been identified, data collection and reporting requirements may be levied for other parameters in addition to those included in Section A of this part.

Pretreatment Standards (40 CFR Part 128) developed pursuant to Section 307 of the Act, require that under no circumstances shall the permittee allow introduction of the following wastes into the waste treatment system:

(a) Wastes which create a fire or explosion hazard in the publicly-owned treatment works.

(b) Wastes which will cause corrosive structural damage to treatment works, but in no case, wastes with a pH lower than 5.0, unless the works is designed to accommodate such wastes.

(c) Solid or viscous substances in amounts which would cause obstruction to the flow in sewers, or other interference with the proper operation of the publicly-owned treatment works.

(d) Wastewaters at a flow rate and/or pollutant discharge rate which is excessive over relatively short time periods so that there is a treatment process upset and subsequent loss of treatment efficiency.

A. GENERAL CONDITIONS

1. Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any unforeseen modifications or anticipated changes in influent characteristics, waste collection systems, industrial contributions, treatment and disposal facilities, operational procedures, elimination of discharge, industry relocation, or other significant activities which will result in new, different, or increased discharges of pollutants, must be reported by submission of a new NPDES application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permit issuing authority of such changes. Following such notice, the permit may be modified to specify and limit any pollutants not previously limited.

2. Noncompliance Notification

If, for any reason, the permittee does not comply with or will be unable to comply with, any effluent limitation specified in this permit, the permittee shall provide the permit issuing authority with the following information, in writing, within five (5) days of becoming aware of such condition:

(a) A description of the discharge and cause of noncompliance; and

(b) The period of noncompliance, including exact dates and times; or, if not corrected, the length of time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

3. Facilities Operation

The permittee shall, at all times, maintain in good working order and operate as efficiently as possible, all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit. The permittee shall provide an adequate operating staff which is duly qualified to carry out the operation, maintenance, and testing functions required to insure compliance with the conditions of this permit.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to navigable waters resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypass of Facilities

The unplanned diversion or bypass of any discharge from all facilities (including all collection system lift stations) is prohibited, except where unavoidable to prevent loss of life or severe property damage.

The permittee shall immediately notify the permit issuing authority of any such diversion or bypass in accordance with the procedures specified for reporting noncompliance in Part II, A.2, Noncompliance Notification.

If, for other reasons, a partial or complete bypass is considered necessary, a request for such bypass shall be submitted to the permit issuing authority at least sixty (60) days prior to the proposed bypass. The request shall contain the following information:

(a) The reason for the proposed bypass.

(b) The anticipated amount of time the discharge will occur.

(c) The contents of the discharge.

(d) Steps which will be taken by the permittee to mitigate any effect of the irregular discharge or condition on the receiving water(s).

(e) The anticipated effect on the receiving water(s).

(f) Any measures that might be necessary for downstream users to take in order to protect their interests.

(g) Steps that will be taken to prevent recurrence of the abnormal condition.

If the proposed bypass is judged acceptable by the permit issuing authority, the bypass will be allowed subject to limitations imposed by the permit issuing authority.

If, after review and consideration, the proposed bypass is determined to be unacceptable by the permit issuing authority, or if limitations imposed on an approved bypass are violated, such bypass shall be considered a violation of this permit; and the fact that application was made, or that a partial bypass was approved, shall not be a defense to any action brought thereunder.

6. Removed Substances

Solids, sludges, filter backwash, screenings, or other pollutants removed in the course of treatment or control of wastewaters, shall be disposed of in a manner such as to prevent any pollutants from such materials from entering navigable waters.

7. Power Failures

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

(a) In accordance with the Schedule of Compliance contained in Part I, provide an alternative power source sufficient to operate the wastewater control facilities;

or, if such alternative power source is not in existence, and no date for its implementation appears in Part I,

(b) Take such precautions as are necessary to maintain and operate the facility under his control in a manner that will minimize upsets and insure stable operation until power is restored.

8. Right of Entry

The permittee shall allow the head of the State of South Dakota water pollution control agency, the Regional Administrator, and/or their authorized representatives, upon the presentation of credentials:

(a) To enter upon the permittee's premises where an effluent source is located or in which any records required under the terms and conditions of this permit are kept; and

(b) At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any discharge of pollutants.

9. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the permit issuing authority.

10. Availability of Reports

Except for data determined to be confidential under Section 308 of the Act, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the permit issuing authority. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statements on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act.

11. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part, during its term for cause including, but not limited to, the following:

(a) Violation of any terms or conditions of this permit;

(b) Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

(c) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

12. Toxic Pollutants

Notwithstanding Part II, A-11 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge, and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified.

13. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

14. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

15. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

16. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

17. Authority of the Regional Administrator

Should there be a violation of any conditions of this permit, the Regional Administrator has the authority under Section 402(h) of the Federal Water Pollution Control Act Amendments of 1972, to proceed in a court of competent jurisdiction, to restrict or prohibit further connections and to thereby restrict or prohibit introduction of further pollutants to the treatment system covered by this permit by any sources not utilizing the system prior to the finding that such a violation occurred. It is intended that this provision be implemented by the permit issuing authority as appropriate.

18. Permit Duration and Reapplication

This permit will be in effect until December 31, 1977. If the permittee desires to continue to discharge, he shall reapply at least 180 days before this permit expires using the application forms then in use.

19. Definitions

Except as otherwise specifically provided:

(a) The term "Act" means the Federal Water Pollution Control Act Amendments of 1972, Public Law 92-500.

(b) The term "Director" means the Director of the South Dakota Department of Environmental Protection or his designated representative.

(c) The term "Major Contributing Industry" means any industry that: (1) has a flow of 50,000 gallons or more per average workday; (2) has a flow greater than five (5) percent of the flow carried by the municipal system receiving the waste; (3) has in its waste, a toxic pollutant in toxic amounts as defined in standards issued under Section 307(a) of the Act; or (4) has significant impact, either singly or in combination with other contributing industries, on the treatment works or the quality of its effluent.

(d) The term "Permit Issuing Authority" means:

(1) U.S. Environmental Protection Agency
Suite 900, 1860 Lincoln Street
Denver, Colorado 80203

(2) South Dakota Department of
Environmental Protection
State Office Building No. 2
Pierre, South Dakota 57501

(e) The term "Regional Administrator" means the Regional Administrator of Region VIII of the Environmental Protection Agency or his designated representative.

PART III

OTHER REQUIREMENTS

A. Sludge Disposal

The permittee shall, by no later than September 30, 1975, submit plans for handling sludge, including the provisions for ultimate disposal. The plans shall be submitted to the South Dakota Department of Environmental Protection. In the event that the permittee operates a lagoon facility without any sludge removal equipment, the above requirement need not be complied with.

B. State Operations Report

In addition to the monitoring report required in Part I, Section C, a monthly operations report should also be submitted to the State of South Dakota.

C. Review of Permit Conditions

At the completion of phase II of the facilities plan under the Step I predesign planning process (Lead-Deadwood Sanitary District No. 1), a complete review of the conditions of this permit shall be accomplished by the South Dakota Department of Environmental Protection, the U.S. Environmental Protection Agency, the Lead-Deadwood Sanitary District No.1, the Homestake Mining Company, and other interested parties. Such review shall analyze all new relevant information including bioassay results, proposed system configurations, discharge locations, and economic and technical data. Conclusions and recommendations shall be developed by the permitting authority regarding any necessary and justified changes to this permit. Recommended changes shall then be incorporated into this permit, subject to review and opportunity for public comment in accordance with all regulations on the procedures for such actions.